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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

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

**[Docket No. FAA-2013-0143; Directorate Identifier 2013-NE-06-AD; Amendment 39-17561; AD 2013-16-23]**

**RIN 2120-AA64**

#### **Airworthiness Directives; Rolls-Royce plc 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 certain Rolls-Royce plc (RR) RB211-524B-02; -524B2-19; -524B3-02; -524B4-02; -524C2-19; -524D4-19; -524D4-B-19; -524D4-39; -535C-37; -535E4-37; -535E4-B-37, and -535E4-B-75 turbofan engines, and all RB211-524G2-19; -524G3-19; -524H2-19; and -524H-36 turbofan engines. This AD requires a one-time inspection of the front combustion liner (FCL) metering panel to determine if it is made from N75 material and, if so, replacing it with an FCL made from C263 material. This AD was prompted by the discovery of a cracked and distorted FCL metering panel, which was made from N75 material. We are issuing this AD to prevent hot gases from burning through the engine casing, which could result in an under-cowl fire and damage to the airplane.

**DATES:** This AD becomes effective October 8, 2013.

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of October 8, 2013.

**ADDRESSES:** 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.

#### **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 Mandatory Continuing Airworthiness Information (MCAI), the regulatory evaluation, any comments received, and other information. The street address

for the Docket Operations office (phone: 800-647-5527) is provided in the ADDRESSES section. Comments will be available in the AD docket shortly after receipt.

**FOR FURTHER INFORMATION CONTACT:** Robert Green, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; phone: 781-238-7754; fax: 781-238-7199; email: robert.green@faa.gov.

## **SUPPLEMENTARY INFORMATION:**

### **Discussion**

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to include an AD that would apply to the specified products. The NPRM was published in the Federal Register on April 5, 2013 (78 FR 20505). The NPRM proposed to correct an unsafe condition for the specified products. The MCAI states:

During investigation of a starting problem with an RB211-535E4-B-37 engine, the Fuel Spray Nozzles (FSNs) appeared misaligned and the engine was removed. Further investigation found that the FSNs were correctly positioned but that the Front Combustion Liner (FCL) metering panel (reference Engine Illustrated Parts Catalogue (EIPC) section 72-41-13, Figure/Item 02-324) was cracked and distorted. Laboratory investigation revealed that the FCL metering panel was made of N75 material rather than the specified C263 material.

Rolls-Royce (RR) issued SB RB.211-72-7221 in 1984, to address the issue of cracking of FCL metering panels manufactured in N75 material. SB RB.211-72-7221 replaces the FCL metering panel manufactured in N75 material with one manufactured in C263 material. The FCL metering panel in so-called Phase 2 combustors of the RB211-524G/H and RB211-535C/E4/E4-B series engines was specified in C263 material from engine type at entry into service.

Based on these findings, it was determined that installation of N75 material FCL metering panels on an engine where C263 was the intended material may result in metering panel cracking and distortion.

### **Comments**

We gave the public the opportunity to participate in developing this AD. We considered the comments received.

### **Request To Correct an Applicability Date**

American Airlines (AAL) requested that we correct a date cited in paragraph (c)(4)(i) of the NPRM (78 FR 20505, April 5, 2013) used to determine the affected engines. The NPRM states that combustion liners supplied by RR after April 23, 2011 are not affected by this AD, whereas RR Alert Non-Modification Service Bulletin (NMSB) No. RB.211-72-AG046, Revision 3, dated December 6, 2012, and RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, cite the correct date as April 23, 2007.

We agree. We changed the date. Paragraph (c)(4) of this AD now states that combustion liners supplied by RR after April 23, 2007, are not affected by this AD.

## **Request To Allow Alternative Inspection Method During Engine Shop Visits**

AAL and Texas Aero Engine Services, LLC (TAESL) requested that we allow using RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, as a means to comply with the FCL inspections. AAL indicated that the Alert NMSB defines an inspection equivalent to that in the AD, which therefore should allow using the NMSB at the shop level. In addition, TAESL requested that we allow using Revision 1, Revision 2, or later revisions of RR Alert NMSB No. RB.211-72-AF572 to comply with the AD.

We partially agree. We agree that RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, or Revision 1, dated October 10, 2008, provide an acceptable inspection. We changed the AD to add RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, and Revision 1, dated October 10, 2008, to the compliance paragraph, by adding paragraphs (e)(2)(ii) and (e)(3)(ii).

New paragraph (e)(2)(ii) states: "You may use paragraph 3.B. of the Accomplishment Instructions in RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, or Revision 1, dated October 10, 2008, or paragraph 3. of RR Alert NMSB No. RB.211-72-AG183, Revision 3, dated December 6, 2012, for engine shop visit inspections."

New paragraph (e)(3)(ii) states: "You may use paragraph 3.B. of the Accomplishment Instructions in RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, or Revision 1, dated October 10, 2008, or paragraph 3. of RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012, for engine shop visit inspections."

We disagree with including possible future versions of the Alert NMSB because what future versions may contain is speculation. We did not change the AD.

## **Request To Use Spectroscopic Analysis To Determine if the FCL Metering Panel Is Made From N75 Material**

AAL requested that we allow an alternate procedure to obtain and analyze the FCL material. RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012, requires the use of an alloy sorter to identify the FCL material as either C263 or N75. If the sorter identifies the material as N75, the Alert NMSB requires that a sample be provided to RR for confirmation by spectroscopic analysis. AAL proposed an alternate procedure be accepted to obtain and analyze a sample of material from the FCL in accordance with RB.211-72-AG046, paragraph 3.(B).5.(p)(i) for all inspections instead of using the alloy sorter as a preliminary step. The alternative procedure includes the use of a local laboratory for the spectroscopic analysis.

We agree. Paragraph 3.(B).5.(p)(i) identifies, among other things, how to obtain the sample. AAL's alternate process uses paragraph 3.(B).5.(p)(i) to obtain the sample. AAL's proposed follow-on analysis is simpler as it avoids use of the alloy sorter. However, spectroscopic analysis then becomes required. The analysis need not be limited to RR facilities, but can be conducted locally in the context of an FAA-accepted maintenance or quality plan.

We changed the AD by adding paragraphs (e)(2)(iii) and (e)(2)(iv), and also (e)(3)(iii) and (e)(3)(iv).

New paragraph (e)(2)(iii) states: "You may use paragraph 3.B.(5)(p)(i) of RR Alert NMSB No. RB.211-72-AG183, Revision 3, dated December 6, 2012, and a spectroscopic analysis, instead of paragraphs 3.B.(3) through 3.B.(5)(p) and paragraphs 3.C.(5)(q) and (r)."

New paragraph (e)(3)(iii) states: "You may use paragraph 3.C.(5)(p)(i) of RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012, and a spectroscopic analysis, instead of paragraphs 3.C.(3) through 3.C.(5)(p), and paragraph 3.C.(5)(q)."

New paragraphs (e)(2)(iv) and (e)(3)(iv) state: "You may use a local facility in the context of an FAA-accepted maintenance or quality plan to perform the spectroscopic analysis."

## **Request To Substitute Locally Sourced Tools To Conduct Pressure Test**

AAL requested that we allow the use of a locally sourced pressure test adaptor and pressure gauge in place of tools specified by part number in RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012.

We agree. Locally sourced tooling approved under an FAA-accepted maintenance or quality plan is acceptable for use. We changed the AD by adding paragraph (e)(3)(v) which states: "The accomplishment instructions in paragraphs 3.B.(6)(g)(iii) and 3.B.(6)(j)(i) of RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012, specify use of RR tooling for the post-inspection fuel manifold pressure test. However, you may use locally sourced tooling in the context of an FAA-accepted maintenance or quality plan."

## **Request To Be Less Precise in References to NMSB Revision Numbers**

TAESL requested that we not specify use of RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012, for the inspection, and that we either remove the revision number or add the words "or later revision" because service bulletins can be revised frequently. Similarly, TAESL requested that in paragraph (c)(ii), Applicability, we change the reference to RR Alert NMSB No. RB.211-72-AF572 to say "Revision 1 or 2, or later revision."

We partially agree.

We agree that RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, and Revision 1, dated October 10, 2008, and Initial Issue, dated October 15, 2007 are acceptable inspections for prior compliance. We changed the AD by adding paragraph (f), Credit for Previous Actions.

New paragraph (f) states: "(1) You have satisfied the inspection requirement of paragraph (e) of this AD if, before the effective date of this AD, you performed the actions prescribed in this AD using: (i) RR Alert NMSB No. RB.211-72-AG183, Revision 3, dated December 6, 2012, or Revision 2, dated June 8, 2012, or Revision 1, dated November 16, 2010, or Initial Issue, dated December 17, 2009; or (ii) RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012, or Revision 2, dated June 7, 2012, or Revision 1, dated January 17, 2011, or Initial Issue, dated December 17, 2009; or (iii) RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, or Revision 1, dated October 10, 2008, or Initial Issue, dated October 15, 2007; or (iv) RR Repeater Technical Variance No. 75295, Issue 1, dated April 20, 2007."

We disagree with including possible future versions of the Alert NMSB because what future versions may contain is speculation. We did not change the AD.

## **Request To Replace Flight Cycle Requirement With Compliance at Next Shop Visit**

UPS requested that we remove from compliance the flight cycle requirement and instead require compliance at the next shop visit. UPS has completed inspection of 67 of 89 affected engines, with no findings. The remaining engines are locked in specific geographic areas that do not afford favorable opportunities to accomplish material verification. UPS believes the risk of finding a combustion liner metering panel fabricated of N75 material is low.

We disagree. The RR risk assessment that we reviewed estimates 25 field findings. There have been seven findings to date, leaving 18 potential additional findings. The cyclic compliance requirement, average fleet utilization, and alternative inspection methods provide adequate ability to manage remaining inspections in a timely manner during scheduled maintenance opportunities. We did not change the AD.

## **Request To Lower the Estimated Costs of Compliance**

AAL requested that we lower, based on the inspection results to date, our estimate of costs of compliance. The NPRM (78 FR 20505, April 5, 2013) estimates that 315 engines of U.S. registry are affected, and that 12 engines will test positive for N75. AAL believes that this estimate is too high.

AAL stated that, to date, 770 engines of the worldwide fleet have been inspected using RR NMSB No. RB.211-72-AF572 and RB.211-72-AG046. Two engines were confirmed to have an N75 material FCL metering panel in the shop using RB.211-72-AF572 and one was the original event engine. No engines with confirmed FCL metering panel with N75 material have been found in the worldwide fleet using RR NMSB No. RB.211-72-AG046.

We disagree. As of March 15, 2013, we are aware of seven findings—the known failure of one engine, two findings for new production engines, and four findings for engines inspected in the field. We did not change the AD.

## **Conclusion**

We reviewed the available data, including the comments received, and determined that air safety and the public interest require adopting this AD with the changes described previously. We determined that these changes will not increase the economic burden on any operator or increase the scope of this AD.

## **Costs of Compliance**

We estimate that this AD will affect about 315 RR RB211-524 and RB211-535 turbofan engines installed on airplanes of U.S. registry. We also estimate that it will take about 11 hours per engine to comply with this AD. The average labor rate is \$85 per hour. Required parts will cost about \$108,887 per engine. We anticipate that 12 FCL metering panels will fail inspection. Based on these figures, we estimate the cost of the AD on U.S. operators to be \$1,601,169.

## **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 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 this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866,
- (2) Is not a "significant rule" under the 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.

We prepared a regulatory evaluation of the estimated costs to comply with this AD and placed it in the AD docket.

### **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 AD:



**2013-16-23 Rolls-Royce plc:** Amendment 39-17561; Docket No. FAA-2013-0143; Directorate Identifier 2013-NE-06-AD.

**(a) Effective Date**

This airworthiness directive (AD) becomes effective October 8, 2013.

**(b) Affected ADs**

None.

**(c) Applicability**

This AD applies to:

(1) All Rolls-Royce plc (RR) RB211-524G2-19; -524G3-19; -524H2-19; and -524H-36 turbofan engines;

(2) RR RB211-524B-02; -524B2-19; -524B3-02; -524B4-02; -524C2-19; -524D4-19; -524D4-B-19; and -524D4-39 turbofan engines that have incorporated RR Service Bulletin (SB) No. RB.211-72-7221, dated December 7, 1984;

(3) All RR RB211-535C-37; -535E4-37; -535E4-B-37, and -535E4-B-75 turbofan engines, except those engines that have incorporated RR SB No. RB.211-72-C230, Revision 1, dated November 22, 2012, or Initial Issue, dated November 16, 1999.

(4) This AD does not apply to engines listed in paragraphs (c)(1) through (c)(3) of this AD that have installed a front combustion liner (FCL) metering panel delivered from RR after April 23, 2007.

**(d) Reason**

This AD was prompted by the discovery of a cracked and distorted FCL metering panel, made from N75 material. We are issuing this AD to prevent hot gases from burning through the engine casing, which could result in an under-cowl fire and damage to the airplane.

**(e) Actions and Compliance**

Unless already done, do the following actions.

(1) At the next engine shop visit or within 625 flight cycles, whichever occurs first after the effective date of this AD, perform a one-time inspection of the FCL metering panel to determine if it is made from N75 material, and if made from N75 material, replace it with one made from C263 material.

(2) To inspect RR RB211-524 series turbofan engines:

(i) Use paragraph 3. of the Accomplishment Instructions of RR Alert Non-Modification Service Bulletin (NMSB) No. RB.211-72-AG183, Revision 3, dated December 6, 2012; or

(ii) You may use paragraph 3.B. of the Accomplishment Instructions in RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, or Revision 1, dated October 10, 2008, or paragraph 3. of RR Alert NMSB No. RB.211-72-AG183, Revision 3, dated December 6, 2012, for engine shop visit inspections.

(iii) You may use paragraph 3.B.(5)(p)(i) of RR Alert NMSB No. RB.211-72-AG183, Revision 3, dated December 6, 2012, and a spectroscopic analysis, instead of paragraphs 3.B.(3) through 3.B.(5)(p), and paragraphs 3.C.(5)(q) and (r).

(iv) You may use a local facility in the context of an FAA-accepted maintenance or quality plan to perform the spectroscopic analysis.

(3) To inspect RR RB211-535 series turbofan engines:

(i) Use paragraph 3. of the Accomplishment Instructions of RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012; or

(ii) You may use paragraph 3.B. of the Accomplishment Instructions in RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, or Revision 1, dated October 10, 2008, or paragraph 3. of RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012, for engine shop visit inspections.

(iii) You may use paragraph 3.C.(5)(p)(i) of RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012, and a spectroscopic analysis, instead of paragraphs 3.C.(3) through 3.C.(5)(p), and paragraph 3.C.(5)(q).

(iv) You may use a local facility to perform the spectroscopic analysis in the context of an FAA-accepted maintenance or quality plan.

(v) The accomplishment instructions in paragraphs 3.B.(6)(g)(iii) and 3.B.(6)(j)(i) of RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012, specify use of RR tooling for the post-inspection fuel manifold pressure test. However, you may use locally sourced tooling in the context of an FAA-accepted maintenance or quality plan.

#### **(f) Credit for Previous Actions**

(1) You have satisfied the inspection requirement of paragraph (e) of this AD if, before the effective date of this AD, you performed the actions prescribed in this AD using:

(i) RR Alert NMSB No. RB.211-72-AG183, Revision 3, dated December 6, 2012, or Revision 2, dated June 8, 2012, or Revision 1, dated November 16, 2010, or Initial Issue, dated December 17, 2009; or

(ii) RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012, or Revision 2, dated June 7, 2012, or Revision 1, dated January 17, 2011, or Initial Issue, dated December 17, 2009; or

(iii) RR Alert NMSB No. RB.211-72-AF572, Revision 2, dated April 2, 2009, or Revision 1, dated October 10, 2008, or Initial Issue, dated October 15, 2007; or

(iv) RR Repeater Technical Variance No. 75295, Issue 1, dated April 20, 2007.

#### **(g) Definition**

For the purpose of this AD, a shop visit is the induction of an engine into the shop for maintenance or overhaul. The separation of engine flanges solely for the purposes of transporting the engine without subsequent engine maintenance does not constitute an engine shop visit.

#### **(h) Alternative Methods of Compliance (AMOCs)**

The Manager, Engine Certification Office, may approve AMOCs for this AD. Use the procedures found in 14 CFR 39.19 to make your request.

#### **(i) Related Information**

For more information about this AD, contact Robert Green, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; phone: 781-238-7754; fax: 781-238 7199; email: robert.green@faa.gov.

Refer to European Aviation Safety Agency AD 2012-0215R1, dated January 4, 2013, for more information. You may examine the AD on the Internet at <http://www.regulations.gov/#!documentDetail;D=FAA-2013-0143-0009>.

**(j) 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) Rolls-Royce plc (RR) Alert Non-Modification Service Bulletin (NMSB) No. RB.211-72-AF572, Revision 2, dated April 2, 2009.

(ii) RR Alert NMSB No. RB.211-72-AF572, Revision 1, dated October 10, 2008.

(iii) RR Alert NMSB No. RB.211-72-AG183, Revision 3, dated December 6, 2012.

(iv) RR Alert NMSB No. RB.211-72-AG046, Revision 3, dated December 6, 2012.

(3) For Rolls-Royce plc service information identified in this AD, contact Rolls-Royce plc, Corporate Communications, P.O. Box 31, Derby, England, DE248BJ; phone: 011-44-1332-242424; fax: 011-44-1332-249936; email: [http://www.rolls-royce.com/contact/civil\\_team.jsp](http://www.rolls-royce.com/contact/civil_team.jsp); Internet: <https://www.aeromanager.com>.

(4) You may view this service information at FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7125.

(5) You may view this service information 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>.

Issued in Burlington, Massachusetts, on August 7, 2013.  
Colleen M. D'Alessandro,  
Assistant Manager, Engine & Propeller Directorate,  
Aircraft Certification Service.