



## Airworthiness Directive

### ▶ Federal Register Information

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2004-18515; Directorate Identifier 2004-NE-12-AD;  
Amendment 39-13921; AD 2004-26-09]

RIN 2120-AA64

Airworthiness Directives; Rolls-Royce Corporation (formerly Allison Engine Company, Allison Gas Turbine Division, and Detroit Diesel Allison) 250-B and 250-C Series Turboprop and Turboshaft Engines

#### PDF Copy (If Available):



2004-26-09.pdf

### ▼ Preamble Information

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for Rolls-Royce Corporation (RRC) 250-B and 250-C series turboprop and turboshaft engines with certain part numbers (P/Ns) of compressor adaptor couplings manufactured by Alcor Engine Company (Alcor), EXTEX Ltd. (EXTEx), RRC, and Superior Air Parts (SAP) installed. This AD requires operators to remove from service affected compressor adaptor couplings. This AD results from nine reports of engine shutdown caused by coupling failure. We are issuing this AD to reduce the risk of failure of the compressor adaptor coupling and subsequent loss of all engine power.

DATES: This AD becomes effective February 8, 2005.

ADDRESSES: You may examine the AD docket on the Internet at <http://dms.dot.gov> or in Room PL-401 on the plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, DC.

FOR FURTHER INFORMATION CONTACT: Robert Baitoo, Aerospace Engineer, Los Angeles Aircraft Certification Office, FAA, Transport Airplane Directorate, 3960 Paramount Blvd., Lakewood, CA 90712-4137; telephone: (562) 627-5245, fax: (562) 627-5210, for questions about Alcor, EXTEX, or SAP compressor adaptor couplings; and John Tallarovic, Aerospace Engineer, Chicago Aircraft Certification Office, FAA, 2300 East Devon Avenue, Des Plaines, IL 60018-4696; telephone (847) 294-8180; fax (847) 294-7834, for questions about RRC compressor adaptor couplings.

**SUPPLEMENTARY INFORMATION:** The FAA proposed to amend 14 CFR part 39 with a proposed airworthiness

directive (AD). The proposed AD applies to RRC 250-B and 250-C series turboprop and turboshaft engines with certain P/Ns of compressor adaptor couplings manufactured by Alcor, EXTEX, RRC, and SAP installed. We published the proposed AD in the **Federal Register** on July 1, 2004 (69 FR 39877). That action proposed to require operators to remove from service affected couplings. That proposal results from nine reports of engine shutdown caused by compressor adaptor coupling failure.

### **Examining the AD Docket**

You may examine the docket that contains the AD, any comments received, and any final disposition in person at the DMS Docket Offices between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The Docket Office (telephone (800) 647-5227) is located on the plaza level of the Department of Transportation Nassif Building at the street address stated in **ADDRESSES**. Comments will be available in the AD docket shortly after the DMS receives them.

### **Comments**

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

### **Request To Change the Impeller-to-Coupling Target Fit Tolerance**

One commenter, RRC, requests that we change the fit between the compressor impeller and the coupling from 0.0000 to -0.0018 inch, to 0.0000 to -0.0013 inch in the final rule. Based upon rig tests, RRC has changed their recommended fit between the impeller and coupling. We agree. We have changed paragraph (i)(4) and Table 3 of the final rule to reflect these new fit values.

### **Request To Clarify the Compliance Section**

The same commenter, RRC, requests the following wording changes to the AD to clarify the compliance section:

Change Table 3 in the AD by deleting the column titled Impeller ID. There is no need to specify the impeller ID in Table 3. The key dimension is the fit between the impeller and the coupling and the column listing the impeller ID is unnecessary and only adds confusion.

Change paragraph (h) from "Remove RRC compressor adaptor couplings, P/Ns 23039791-1, -2, and -3 from service at next access but not later than March 1, 2012" to "Remove RRC compressor adaptor couplings, P/Ns 23039791-1, -2, and -3 from service next time the compressor rotor is disassembled for any reason but not later than March 1, 2012." This change more precisely defines the circumstances when the coupling must be replaced.

Change paragraph (i)(1) from "Machine the inside diameter (ID) to accept the next larger size outside diameter (OD) compressor adapter coupling" to "Select and measure pilot OD of a new larger dash size coupling."

Change paragraph (i)(4) from "A fit of 0.0000 to -0.0018 inch must be achieved. No fretting is allowed on the impeller after machining" to "Machine inside diameter (ID) of impeller to achieve a fit of 0.000 to -0.0013 inch. No fretting is allowed on the impeller after machining."

Add a paragraph under (i) that states "A new coupling must never be installed into a worn impeller." These changes to paragraph (i) would clarify what should be done when the impeller and coupling are serviced.

We agree with the intent of these requested changes and have incorporated them in the final rule. We have added paragraph (i)(10) that states the mating surfaces of the impeller and coupling must not have any fretting, and states, do not install a -1 coupling into a used impeller, to address the commenter's concerns to add a paragraph (i).

### **Request To Correct the Costs of Compliance**

One commenter requests that the economic evaluation be revised to better reflect the actual costs of the action. The commenter states that the FAA's economic impact estimate didn't consider engine and compressor removal, and shipping and out-of-service time if compliance doesn't coincide with a scheduled maintenance event.

We do not agree. The costs are for replacing the coupling. We do not include any other costs.

### **Availability of Improved Couplings**

One commenter states that the improved couplings may not be available in sufficient quantities to support the proposed compliance schedule for the parts manufacturer approval (PMA) parts.

We partially agree. The improved couplings may be unavailable in sufficient quantities to support the compliance schedule for the engines with EXTEX, SAP, and ALCOR PMA couplings. However, the compliance schedules are based primarily on our evaluation of field management plans developed by those PMA manufacturers.

#### **Clarification of Field Management Responsibility**

EXTEX states that although it has agreed to include SAP couplings in the EXTEX service documents, for clarification, EXTEX requests we note that it is not responsible for the field management of the SAP produced couplings, nor is EXTEX responsible for any costs and liabilities associated with parts produced by SAP.

We agree to note EXTEX's comment.

#### **Request To Return Removed Couplings for Analysis**

One commenter requests that all removed, failed, cracked or fretted couplings of any part number should be returned to the manufacturer for analysis and reported to the FAA of any significant findings. This would help to gain more knowledge of the failure mode of couplings.

We do not agree. We have a good understanding of the failure mode of the coupling and the marginal benefit of additional data does not justify the cost burden on the operators to return these couplings.

#### **Request for Explanation of Compliance Time**

One commenter requests an explanation of the year 2012 compliance time for the RRC couplings. The commenter states there may be less attention given to this problem if there is a 7.5 year compliance period.

We do not agree. As stated in the proposal, each manufacturer is responsible for their independent component design, design substantiation, component manufacture, and development of a field management plan for its fleet. An important element of the field management plans is the risk assessment. The varying outcomes of those independent risk assessments lead to differing compliance intervals. The compliance time for Rolls-Royce couplings is not intended to convey the message that there is little risk. Operators are expected to use the compliance time to schedule the maintenance actions required by this AD.

#### **Request To Add a Comment To Explain the Dimension Change for Press Fit and Add Requirement for Surface Finish**

One commenter requests we add a comment on how the press fit for the compressor adaptor coupling has changed, and requests we add a requirement for the correct surface finish for the impeller surface. The commenter states that the fit between the compressor adaptor coupling and the impeller is critical.

We partially agree. We specified the change to the press fit for the compressor adaptor coupling in the compliance section of the final rule. Since the surface finish is specified in the Overhaul Manual, we will not include the surface finish of 40 microinches for the machined impeller in the final rule.

#### **Costs of Compliance Could Be Mitigated**

One commenter states the costs of compliance could be mitigated by stating the costs occur over 7 years. The commenter gave no specific justification.

We do not agree. The estimated costs of compliance for this AD already takes into account the 6,000 engines affected, without basing estimates over 7 years.

#### **Request for Explanations**

One commenter requests that we explain the physical difference between the RRC P/N 23076559-1 and RRC P/N 23039791. The physical difference is that RRC P/N 23076559 has a coating that is more resistant to fretting compared to P/N 23039791.

The commenter also asks why the -1 version of the P/N 23036559 compressor adapter coupling is installed only when a new impeller is installed.

The -1 coupling is the smallest size and will only fit correctly into a new impeller. As stated in the proposal, a used impeller must be machined before a new compressor adaptor coupling can be installed. This action is required to clean all fretting damage from the surface of the impeller that mates with the coupling. Once an impeller has been machined, a larger (-2 or -3) coupling is required.

Also, the commenter requests to allow installation of a "1 coupling into a used impeller, if the fit is correct.

We do not agree. A -1 coupling cannot be installed in a used impeller even if the fit is correct. The surface of a used impeller that mates to the coupling must be cleaned by machining. After machining, a larger coupling is required.

### **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**

There are about 9,000 RRC 250-B and 250-C series turboprop and turboshaft engines of the affected design in the worldwide fleet. We estimate that 6,000 engines installed on helicopters and airplanes of U.S. registry will be affected by this AD. We also estimate that it would take about 3 work hours per engine to perform the actions when done at time of rotor disassembly, and that the average labor rate is \$65 per work hour. Required parts will cost about \$1,601 per engine. Based on these figures, we estimate the total cost of the AD to U.S. operators to be \$10,776,000.

### **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, 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:

**▼ Regulatory Information**

**2004-26-09 Rolls-Royce Corporation (formerly Allison Engine Company, Allison Gas Turbine Division, and Detroit Diesel Allison):** Amendment 39-13921. Docket No. FAA-2004-18515; Directorate Identifier 2004-NE-12-AD.

**Effective Date**

(a) This airworthiness directive (AD) becomes effective February 8, 2005.

**Affected ADs**

(b) None.

**Applicability**

(c) This AD applies to Rolls-Royce Corporation (formerly Allison Engine Company, Allison Gas Turbine Division, and Detroit Diesel Allison) 250-B17, -B17B, -B17C, -B17D, -B17E, 250-C20, -C20B, -C20F, -C20J, -C20S, and -C20W series turboprop and turboshaft engines with the compressor adaptor couplings installed listed in the following Table 1:

**Table 1.-Affected Compressor Adaptor Couplings**

<b>Manufacturer</b>	<b>Affected part numbers</b>
Alcor Engine Company (Alcor)	P/Ns 23039791AL. 23039791AL-1/-2/-3.
EXTEX Ltd. (EXTEX)	A23039791. E23039791. E23039791-1/-2/-3. EH23039791. EH23039791-1/-2/-3.
Rolls-Royce Corporation (RRC)	23039791-1/-2/-3.
Superior Air Parts (SAP)	A23039791.

These engines are installed on, but not limited to, the aircraft in the following Table 2:

**Table 2.-Applicable Aircraft**

<b>Helicopters</b>
Agusta Models. A109, A109A, A109A II.
Bell Models. 206A, 207B, 206L.
Enstrom Models. TH-28, 480, 480B.
Eurocopter France Models.

AS355E, AS355F, AS355F1, AS355F2.
Eurocopter Deutschland Models. BO-105C, BO-105S.
MDHI Models. 369D, 369E, 369H, 369HM, 369HS, 369HE.
Schweizer Model 269D.
<b>Airplanes</b>
B-N Group Ltd. Model. BN-2T.

### Unsafe Condition

(d) This AD results from nine reports of engine shutdown caused by compressor adaptor coupling failure.

### 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.

### Alcor Compressor Adaptor Couplings

(f) Remove Alcor compressor adaptor couplings, P/Ns 23039791AL, 23039791AL-1, -2, and -3 from service as follows:

(1) For couplings with 600 or more operating hours-since-new as of the effective date of this AD, or the operating hours are unknown and cannot be determined, remove couplings from service at next access but not to exceed 50 additional operating hours.

(2) For couplings with fewer than 600 operating hours-since-new on the effective date of this AD, remove couplings from service at next access but not to exceed 649 operating hours-since-new.

### EXTEX and SAP Compressor Adaptor Couplings

(g) Remove EXTEX and SAP compressor adaptor couplings, P/Ns A23039791, E23039791, E23039791-1, -2, and -3, EH23039791, and EH23039791-1, -2, and -3, from service as follows:

(1) For couplings with operating hours that are unknown and cannot be determined, remove couplings from service at next access but not to exceed 50 additional operating hours.

(2) For couplings with 600 or more operating hours-since-new as of the effective date of this AD, remove couplings from service at next access but not to exceed 100 additional operating hours.

(3) For couplings with fewer than 600 operating hours-since-new on the effective date of this AD, remove couplings from service at next access but not to exceed 150 additional operating hours.

### RRC Compressor Adaptor Couplings

(h) Remove RRC compressor adaptor couplings, P/Ns 23039791-1, -2, and -3 from service next time the compressor rotor is disassembled for any reason, but not later than March 1, 2012.

### Installation Requirements for Compressor Adaptor Couplings

(i) Machine the compressor impeller as follows:

(1) Select and measure the pilot outside diameter (OD) of a new larger dash size coupling.

(2) For example, if a -1 coupling was removed, a -2 coupling must be installed.

(3) If a -3 coupling is removed, a new impeller is required.

- (4) Machine the inside diameter (ID) of the compressor impeller to achieve a fit of 0.0000 to -0.0013 inch. No fretting is allowed on the impeller after machining.
- (5) Due to previous fretting, an impeller with a -1 coupling removed might have to be machined for a -3 coupling. Plating of the impeller ID is not allowed.
- (6) Fluorescent penetrant inspect the impeller.
- (7) Install a new compressor adaptor coupling, P/N 23076559-2 or -3; or
- (8) If a new impeller is installed, then install compressor adaptor coupling, P/N 23076559-1.
- (9) Heating of the impeller per the engine overhaul manual is required to install the coupling to achieve the target fit specified in the following Table 3:

**Table 3.-Impeller-to-Coupling Target Fit**

New adaptor	Adaptor OD	Fit (interference)
(i) 23076559-1	0.9000 to 0.9008 inch	0.0000 to -0.0013 inch.
(ii) 23076559-2	0.9020 to 0.9028 inch	0.0000 to -0.0013 inch.
(iii) 23076559-3	0.9040 to 0.9048 inch	0.0000 to -0.0013 inch.

- (10) The mating surfaces of the impeller and coupling must not have any fretting. Do not install a -1 coupling into a used impeller.

**Definition**

- (j) For the purposes of this AD, next access is defined as when the compressor module is separated from the engine and disassembled for any reason.

**Alternative Methods of Compliance**

- (k) The Manager, Los Angeles Aircraft Certification Office, has the authority to approve alternative methods of compliance for Alcor, EXTEX, and SAP adaptor couplings addressed in this AD if requested using the procedures found in 14 CFR 39.19. The Manager, Chicago Aircraft Certification Office, has the authority to approve alternative methods of compliance for RRC adaptor couplings addressed in this AD if requested using the procedures found in 14 CFR 39.19.

**Related Information**

- (l) Alcor SLB No. 814-3-1, Revision C, dated April 28, 2004, EXTEX Alert Service Bulletin T-081, Revision B, dated May 4, 2004, and RRC [CEB-A-1392](#) and [CEB-A-1334](#), dated September 9, 2003, pertain to the subject of this AD.

**▼ Footer Information**

Issued in Burlington, Massachusetts, on December 23, 2004.  
 Jay J. Pardee,  
 Manager, Engine and Propeller Directorate,  
 Aircraft Certification Service.  
 [FR Doc. 05-14 Filed 1-3-05; 8:45 am]  
 BILLING CODE 4910-13-P

**▼ Comments**