



Notification of a Proposal to issue an Airworthiness Directive

AD No.: 18-066

Issued: 04 May 2018

Note: This Proposed Airworthiness Directive (PAD) is issued by EASA, acting in accordance with Regulation (EC) 216/2008 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation.

In accordance with the EASA Continuing Airworthiness Procedures, the Executive Director is proposing the issuance of an EASA Airworthiness Directive (AD), applicable to the aeronautical product(s) identified below.

All interested persons may send their comments, referencing the PAD Number above, to the e-mail address specified in the 'Remarks' section, prior to the consultation date indicated.

Design Approval Holder's Name:

ROLLS-ROYCE plc

Type/Model designation(s):

RB211-535E4 engines

Effective Date: [TBD - standard: 14 days after AD issue date]

TCDS Number(s): EASA E.061

Foreign AD: Not applicable

Supersedure: This AD supersedes United Kingdom (UK) CAA AD 002-01-2000 dated January 2000.

ATA 72 – Engine – Low Pressure Compressor Blades – Inspection

Manufacturer(s):

Rolls-Royce plc (RR)

Applicability:

RB211-535E4-37, RB211-535E4-B-37, RB211-535E4-C-37 and RB211-535E4-B-75 engines, all serial numbers. These engines are known to be installed on, but not limited to, Boeing 757 and Tupolev Tu204 aeroplanes.

Definitions:

For the purpose of this AD, the following definitions apply:

The NMSB: RR Alert Non-Modification Service Bulletin (NMSB) RB.211-72-AC879 Revision 9 dated 23 April 2018. The NMSB has an 'A' (Alert) in the number, but an earlier or later revision may not have that 'A'. This kind of change does not effectively alter the publication references for the purpose of this AD.

The modification SB: RR Service Bulletin (SB) RB.211-72-C946 (any revision).



Affected fan blade: All fan blades, all Part Numbers (P/N), except those that are post-SB/post-mod 72-C946, which can be visually identified by a blue triangle etched on the blade aerofoil suction surface close to the leading edge tip.

Groups: Group 1 engines are those that have an affected fan blade installed. Group 2 engines are those that do not have an affected fan blade installed. An engine on which RR SB RB.211-72-C946 (any revision) has been embodied in service, or mod 72-C946 embodied in production, is a Group 2 engine, provided the engine remains in that configuration.

Reason:

During engine overhaul, inspection of a high life set of low pressure compressor (LPC) fan blades revealed small cracks in the blade roots on the concave root flank. These cracks had originated at the edge of bedding from multiple origins. Root cause analysis indicated the cause of the crack initiation to be the absence of the anti-fretage coating.

This condition, if not detected and corrected, could lead to fan blade failure, possibly resulting in release of high energy non-contained debris from the engine, with consequent damage to the aeroplane.

To address this condition, RR issued NMSB RB.211-72-AC879 (original issue, later revised), providing instructions to inspect high life blades, either on-wing or during engine overhaul. Depending on flight profile flown, different inspection intervals were introduced. Consequently, the UK CAA classified that NMSB as mandatory and issued AD 002-01-2000 accordingly, requiring those repetitive inspections.

Since that AD was issued, it was reported that some engines were operated outside the profiles initially specified, and new flight profiles were introduced to mitigate the risk of overflying the recommended flight profiles. Consequently, the inspection intervals were extended for engines operating within RB211-535E4-B-37 flight profiles C, D and E, and RR issued the NMSB accordingly. Additionally, RR introduced inspection instructions for engines operating within RB211-535E4-C-37 flight profile F and RB211-535E4-37 flight profile G in the NMSB.

For the reasons described above, this AD retains the requirements of UK CAA AD 002-01-2000, which is superseded, amends the compliance times and adds repetitive inspections for engines operating within RB211-535E4-37, RB211-535E4-B-37 and RB211-535E4-C-37 flight profiles C, D, E, F and G. This AD also provides a modification as optional terminating action for the repetitive inspections, and prohibits installation of affected fan blades on post-mod/post-SB engines.

Required Action(s) and Compliance Time(s):

Required as indicated, unless accomplished previously:

Inspection(s):

- (1) For Group 1 engines: Before exceeding the threshold as indicated in Table 1 of this AD, or within 30 days after the effective date of this AD, whichever occurs later, but not before exceeding the applicable 'lower limit' as indicated in Table 1 of this AD, and thereafter, at intervals not to exceed the applicable value as specified in Table 1 of this AD, depending on the engine model and operating flight profile (see Note 1 of this AD), and on the inspection method



(root probe, or surface probe), inspect each fan blade in accordance with the instructions of the NMSB.

Table 1 – Fan Blade Inspection (see Note 1 of this AD)

Model / Flight Profile(s)	Lower Limit	Threshold	Inspection (Probe) Method / Interval (not to exceed)	
			Root	Surface
535E4-37 / B and G	14 650	15 000	850	700
535E4-C-37 / F				
535E4-B-37 / E	19 650	20 000	1 200	1 000
535E4-B-37 / C				
535E4-B-75 / all				
535E4-37 / A			1 400	1 150
535E4-B-37 / D			1 500	1 200

Note 1: The ‘lower limit’ and ‘threshold’ values specified in Table 1 of this AD are engine flight cycles accumulated since first installation of an affected fan blade on an engine.

- (2) For Group 1 engines: During each engine overhaul, for each affected blade that has exceeded the ‘lower limit’ as specified in Table 1 of this AD, inspect that affected blade in accordance with the instructions of the NMSB.

Recalculation:

- (3) For a Group 1 engine having an affected fan blade installed that has operated in more than one flight profile or engine rating at any time during its service life, before exceeding the applicable threshold (see Note 2 of this AD), recalculate the equivalent cycles since new in accordance with the instructions of the NMSB.

Note 2: For intermix operation between 535E4 flight profiles A, B and G, 535E4-B flight profiles C, D and E, and 535E4-C flight profile F, the currently used flight profile can be applied to determine the applicable inspection threshold and repeat interval as specified in Table 1 of this AD.

Corrective Action(s):

- (4) If, during any inspection as required by paragraph (1) or (2) of this AD, as applicable, any crack indication of more of 60% screen height is found, before next flight, or before release to service of the engine, as applicable, replace the blade with a serviceable blade in accordance with the instructions of the NMSB.

Credit:

- (5) Inspections and corrective action(s) on an engine, accomplished before the effective date of this AD in accordance with the instructions of NMSB RB.211-72-C879 at Revision 8 or any earlier revision, are acceptable to comply with the initial requirements of this AD. After the effective date of this AD, the instructions of the NMSB (Revision 9) must be used.



Terminating Action:

- (6) Modification of a Group 1 engine in accordance with the modification SB constitutes terminating action for the repetitive inspections required by this AD for that engine.

Parts Installation:

- (7) For Group 1 engines: From the effective date of this AD, except as required by paragraph (8.1) of this AD, it is allowed to install on any engine an affected fan blade, provided that the part is new (never installed on an engine); or has not exceeded the applicable threshold as indicated in Table 1 of this AD; or has passed an inspection (no crack indication, or indication of 60% screen height or less) in accordance with the instructions of the NMSB; and that, following installation, the affected fan blade is inspected as required by this AD.

- (8) Do not install an affected fan blade on an engine, as required by paragraph (8.1) or (8.2) of this AD, as applicable.

(8.1) For Group 1 engines: After (optional) modification of the engine as specified in paragraph (6) of this AD.

(8.2) For Group 2 engines: From the effective date of this AD.

Ref. Publications:

Rolls-Royce NMSB RB.211-72-C879 original issue dated 11 January 2000, or Revision 1 dated 30 June 2000, or Revision 2 dated 4 January 2002, or Revision 3 dated 9 October 2002, or Revision 4 dated 2 April 2004, or Revision 5 dated 8 March 2007, or Revision 6 dated 14 December 2007, or Revision 7 dated 1 May 2009, or Revision 8 dated 18 November 2015, or Alert NMSB RB.211-72-AC879 Revision 9, dated 23 April 2018.

Rolls-Royce SB RB.211-72-C946 original issue dated 29 September 2000, or Revision 1 dated 28 August 2001, or Revision 2 dated 26 September 2002, or Revision 3 dated 22 September 2008, or Revision 4 dated 22 June 2010.

The use of later approved revisions of the above-mentioned documents is acceptable for compliance with the requirements of this AD.

Remarks:

1. This Proposed AD will be closed for consultation on 01 June 2018.
2. Enquiries regarding this PAD should be referred to the EASA Safety Information Section, Certification Directorate. E-mail: ADs@easa.europa.eu.
3. For any question concerning the technical content of the requirements in this PAD, please contact: your designated Rolls-Royce representative, or download the publication from your Rolls-Royce Care account at <https://customers.rolls-royce.com>.

If you do not have a designated representative or Rolls-Royce Care account, please contact **Corporate Communications** at **Rolls-Royce plc**, P.O. Box 31, Derby, DE24 8BJ, United Kingdom, telephone +44 (0)1332 242424, or



send an email through http://www.rolls-royce.com/contact/civil_team.jsp identifying the correspondence as being related to **Airworthiness Directives**.

