



Airworthiness Directive

AD No.: 2018-0094R1

Issued: 29 November 2019

Note: This Airworthiness Directive (AD) is issued by EASA, acting in accordance with Regulation (EU) 2018/1139 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 129 of that Regulation.

This AD is issued in accordance with Regulation (EU) 748/2012, Part 21.A.3B. In accordance with Regulation (EU) 1321/2014 Annex I, Part M.A.301, the continuing airworthiness of an aircraft shall be ensured by accomplishing any applicable ADs. Consequently, no person may operate an aircraft to which an AD applies, except in accordance with the requirements of that AD, unless otherwise specified by the Agency [Regulation (EU) 1321/2014 Annex I, Part M.A.303] or agreed with the Authority of the State of Registry [Regulation (EU) 2018/1139, Article 71 exemption].

Design Approval Holder's Name:

ROLLS-ROYCE DEUTSCHLAND Ltd & Co KG

Type/Model designation(s):

Trent 1000 engines

Effective Date: Revision 1: 06 December 2019
Original issue: 08 May 2018

TCDS Number(s): EASA.E.036

Foreign AD: Not applicable

Revision: This AD revises EASA AD 2018-0094 dated 24 April 2018, which superseded EASA AD 2017-0017R2 dated 15 September 2017.

ATA 72 – Engine – Intermediate Pressure Compressor Rotor Seal – Inspection / De-Pairing Limitations

Manufacturer(s):

Rolls-Royce plc

Applicability:

Trent 1000-A2, Trent 1000-C2, Trent 1000-D2, Trent 1000-E2, Trent 1000-G2, Trent 1000-H2, Trent 1000-J2, Trent 1000-K2, Trent 1000-L2, Trent 1000-AE2 and Trent 1000-CE2 engines, all serial numbers (ESN).

These engines are known to be installed on, but not limited to, Boeing 787-8 and 787-9 aeroplanes.

Definitions:

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

The NMSB: Rolls-Royce Alert Non-Modification Service Bulletin (NMSB) TRENT 1000 72-AJ467 Revision 3. The NMSB has an 'A' (Alert) in the number, but a later revision may not have that 'A'. This kind of change does not effectively alter the publication references.



The SB: Rolls-Royce Service Bulletin (SB) TRENT 1000 72-K216, which (re)introduces the combination of intermediate pressure compressor (IPC) static buffer seal, Part Number (P/N) KH77442 (post-mod/SB 72-J603 standard) and original IPC rotor buffer seal (affected seal) P/N KH19098 configuration.

Affected seal: IPC rotor buffer seals, having P/N KH19098, if installed in combination with an IPC static buffer seal, having P/N KH19094.

Groups: Group 1 engines are those that have an affected seal installed.

Group 2 engines are those that do not have an affected seal installed. An engine that has embodied Rolls-Royce modification (mod) 72-J603 or mod 72-J704 in production, or embodied Rolls-Royce SB TRENT 1000 72-J603, or SB TRENT 1000 72-J704, or the SB in-service, is a Group 2 engine, provided the engine remains in that configuration.

Reason:

A low speed (60 to 65 knots) abort occurred on take-off on a Trent 1000-powered Boeing 787 aeroplane. The pilot performed a commanded engine shutdown and the aeroplane safely returned to the gate. Following investigation, failure and release of the IPC rotor seal was confirmed as having caused this event. Rolls-Royce have confirmed that other IPC rotor seals, P/N KH19098, have been found with cracking at the seal head.

This condition, if not detected and corrected, could lead to engine power loss, possibly resulting in reduced control of the aeroplane.

To address this potential unsafe condition, Rolls-Royce published NMSB TRENT 1000 72-AJ467, providing inspection instructions. Consequently, EASA issued AD 2017-0017 (later revised) to require repetitive borescope inspections of the affected IPC rotor seals and, depending on findings, accomplishment of applicable corrective action(s). Post-mod/SB 72-J603 engines, having a revised IPC buffer static seal assembly, and post-mod/SB 72-J704 engines, having a revised IPC rotor buffer seal, are not affected. Rolls-Royce published SB TRENT 1000 72-J603 and SB TRENT 1000 72-J704 to provide modification instructions for in-service engines. Rolls-Royce also published NMSB TRENT 1000 72-AJ467 Revision 2, introducing a conditional terminating action.

Since EASA AD 2017-0017R2 was issued, Rolls-Royce issued the NMSB, and issued Alert NMSB TRENT 1000 72-AJ929, which is the subject of EASA AD 2018-0095, introducing new de-pairing instructions for engines in post-mod/SB 72-J704 configuration, which affects the de-pairing requirements. Consequently, EASA issued AD 2018-0094, retaining the requirements of EASA AD 2017-0017R2, which was superseded, and amended the de-pairing requirements/limitations accordingly.

Since that AD was issued, Rolls-Royce issued the SB, as defined in this AD, providing an alternative (optional) terminating action for the inspection requirements of EASA AD 2018-0094.

For the reason described above, this AD is revised to introduce the SB as another optional terminating action for Group 1 engines. This revised AD also corrects and clarifies the definition of 'affected seal' and the definition of Group 2 engines.



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

Required as indicated, unless accomplished previously:

Repetitive Inspections:

- (1) For Group 1 engines: Within the compliance times as specified in the NMSB, accomplish an on-wing borescope inspection of the affected seal in accordance with the instructions of Section 3, Part A (front face) of the NMSB, and/or, depending on findings (see Figure 1 of the NMSB), Part B (rear face) of the NMSB, as applicable. Thereafter, depending on findings, repeat the on-wing borescope inspection at intervals not to exceed the value(s) as specified in Figures 1, 2 or 4 of the NMSB, as applicable.
- (2) An in-shop inspection in accordance with the instructions of Rolls-Royce NMSB TRENT 1000 72-J353 may be substituted for an on-wing inspection as required by paragraph (1) of this AD, provided the compliance times are not exceeded.

Limitations:

- (3) From 15 February 2017 [the effective date of the original issue of EASA AD 2017-0017], do not operate an aeroplane, having two Group 1 engines installed that are both subject to the 20 engine flight cycles (EFC) inspection interval (see Figure 4 of the NMSB) as required by paragraph (1) of this AD.
- (4) From 08 May 2018 [the effective date of EASA AD 2018-0094], do not operate an aeroplane, having a Group 1 engine installed that is subject to 20 EFC interval inspections (see Figure 4 of the NMSB) as required by paragraph (1) of this AD; and a Group 2 engine installed that is subject to 50 EFC interval inspections, or to a single 100 EFC fly-on period, as specified in Figures 1 and 2 of Rolls-Royce Alert NMSB TRENT 1000 72-AJ929 [see EASA AD 2018-0095].

Corrective Action(s):

- (5) If, during any on-wing inspection as required by paragraph (1) of this AD, or any in-shop inspection as specified in paragraph (2) of this AD, as applicable, any crack is found on the rear face of the affected seal, that is at or beyond the reject limits as specified in the NMSB, before next flight, or before release to service of the engine, as applicable, replace the affected seal with a new part.

Credit:

- (6) Inspections and corrective actions on an engine, accomplished before 15 February 2017 [the effective date of the original issue of EASA AD 2017-0017] in accordance with the instructions of Alert NMSB TRENT 1000 72-AJ467 (on wing) at original issue, or Revision 1, or Revision 2, or that meet the intent of the NMSB, or Rolls-Royce NMSB TRENT 1000 72-J353 (in-shop), are acceptable to comply with the initial requirements of paragraphs (1) and (5) of this AD for that engine.

Terminating Action(s):

- (7) Modification of an engine in accordance with the instructions of Rolls-Royce SB TRENT 1000 72-J603, or SB TRENT 1000 72-J704, or the SB, as defined in this AD, constitutes terminating action for the repetitive inspections as required by paragraph (1) of this AD for that engine.



- (8) For a Group 1 engine on which an affected seal, by the results of two consecutive inspections of the front face in accordance with the instructions of Section 3, Part A, of the NMSB, is confirmed to be without cracks, no further inspections are required by this AD on that engine, except as required by paragraph (10) of this AD.

Part(s) Installation:

- (9) From 15 February 2017 [the effective date of the original issue of EASA AD 2017-0017], it is allowed to install an affected seal on any Group 1 or Group 2 engine, provided that, following installation, inspections on that engine are (re-)started as required by paragraph (10) of this AD.

Re-starting Inspections:

- (10) Before release to service of an engine after maintenance action on the O2 module, where a new P/N KH19094 IPC static seal and an affected seal are installed, or after replacement of the O2 module, as applicable, contact Rolls-Royce to determine when the repetitive inspections, as required by paragraph (1) of this AD, must be re-started on that engine.

Ref. Publications:

Rolls-Royce NMSB TRENT 1000 72-J353 original issue dated 25 August 2016, or Revision 1 dated 24 November 2016, or Revision 2 dated 14 February 2018.

Rolls-Royce SB TRENT 1000 72-J603 original issue dated 12 October 2016, or Revision 1 dated 08 August 2017, or Revision 2 dated 27 June 2018, or Revision 3 dated 14 March 2019, or Revision 4 dated 05 September 2019.

Rolls-Royce SB TRENT 1000 72-J704 original issue dated 23 June 2017.

Rolls-Royce Alert NMSB TRENT 1000 72-AJ467 original issue dated 9 November 2016, or Revision 1 dated 13 February 2017, or Revision 2 dated 2 June 2017, or Revision 3 dated 14 February 2018.

Rolls-Royce SB TRENT 1000 72-K216 original issue dated 18 June 2019.

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

Remarks:

1. If requested and appropriately substantiated, EASA can approve Alternative Methods of Compliance for this AD.
2. The original issue of this AD was posted on 07 March January 2018 as PAD 18-033 for consultation until 04 April 2018. The Comment Response Document can be found in the [EASA Safety Publications Tool](#), in the compressed (zipped) file attached to the record for this AD.
3. This revised AD was posted on 11 November 2019 as PAD 19-200 for consultation until 25 November 2019. No comments were received during the consultation period.



4. Enquiries regarding this AD should be referred to the EASA Programming and Continued Airworthiness Information Section, Certification Directorate. E-mail: ADs@easa.europa.eu.
5. Information about any failures, malfunctions, defects or other occurrences, which may be similar to the unsafe condition addressed by this AD, and which may occur, or have occurred on a product, part or appliance not affected by this AD, can be reported to the [EU aviation safety reporting system](#).
6. For any question concerning the technical content of the requirements in this AD, 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**.

