

---

# **Type Acceptance Report**

**TAR 11/21B/22 – Revision 1**

**ROLLS ROYCE 250 Series I and II**

## TABLE OF CONTENTS

|  |          |
|--|----------|
| <b>EXECUTIVE SUMMARY</b>                                 | <b>1</b> |
| <b>1. INTRODUCTION</b>                                   | <b>1</b> |
| <b>2. PRODUCT CERTIFICATION DETAILS</b>                  | <b>2</b> |
| <b>3. APPLICATION DETAILS AND BACKGROUND INFORMATION</b> | <b>3</b> |
| <b>4. NZCAR §21.43 DATA REQUIREMENTS</b>                 | <b>4</b> |
| <b>ATTACHMENTS</b>                                       | <b>6</b> |
| <b>APPENDIX 1</b>  | <b>6</b> |

## Executive Summary

New Zealand Type Acceptance has been granted to the Rolls Royce Model 250 Series I and II turbo-shaft engine based on validation of FAA Type Certificate number E4CE. There are no special requirements for import.

All models listed under the FAA type certificate have been type accepted in New Zealand, except for models which were only fitted to military helicopters or have no other known production helicopter application. (250-C10 Series, 250-C19)

Subsequent new variants or serial numbers approved under the State-of-Design type certificate can become type accepted after supply of the applicable documentation, in accordance with the provisions of NZCAR §21.43(c).

NOTE: The information in this report was correct as at the date of issue. The report is generally only updated when an application is received to revise the Type Acceptance Certificate. For details on the current type certificate holder and any specific technical data, refer to the latest revision of the State-of-Design Type Certificate Data Sheet referenced herein.

## 1. Introduction

This report details the basis on which Type Acceptance Certificate No. 11/21B/22 was granted in the Standard Category in accordance with NZCAR Part 21 Subpart B.

Specifically the report aims to:

- (a) Specify the foreign type certificate and associated airworthiness design standard used for type acceptance of the model(s) in New Zealand; and
- (b) Identify any special conditions for import applicable to any model(s) covered by the Type Acceptance Certificate.

The report also notes the status of all models included under the foreign type certificate which have been granted type acceptance in New Zealand, which are listed in Section 2. (Models which were accepted prior to Part 21 under NZCAR Section B.9 are noted in Appendix 1.)

## 2. Product Certification Details

### (a) State-of-Design Type and Production Certificates:

Manufacturer: Rolls Royce Corporation *(since 1 September 2000)*  
Type Certificate: E4CE  
Issued by: Federal Aviation Administration  
Production Approval: PC310

### (b) Models Covered by the Part 21B Type Acceptance Certificate:

(i) **Models:** 250-C18, 250-C18A, 250-C18B, 250-C18C  
250-C20, 250-C20B, 250-C20C, 250-C20F  
250-C20J, 250-C20W  
250-C20R/1, 250-C20R/2, 250-C20R/4  
250-C300/A1, 250-C300/B1

### 3. Application Details and Background Information

The application for New Zealand type acceptance was from the manufacturer, Rolls Royce Corporation, under covering letter dated 13 April 2011. The 250 Series is a turbo-shaft engine of modular construction with reverse flow from the compressor to a single can combustion liner and two-stage gas generator turbine. A two-stage free power turbine is connected through a double reduction gearbox to the output shaft. The engine has been developed over four Series with increased power outputs, although only Series I and II are covered by FAA type certificate E4CE. This “small gearbox” family includes the Models 250-C18, -C20, C20/B/F/R/S and other variants, and encompasses the 250-450 shp range.

Type Acceptance Certificate Number 11/21B/22 was granted on 13 April 2011 to the Rolls Royce Model 250-C300/A1 and /B1 engines based on validation of FAA Type Certificate number E4CE. Specific applicability is limited to the coverage provided by the documentation supplied. There are no special requirements for import into New Zealand.

The Allison 250 Series was first developed as the T63 for the US Army Light Observation Helicopter competition in the early 1960s, and was the selected powerplant for all three contenders. Although the competition was won by the Hughes OH-6, all three went on to become successful civil helicopters as the Hughes 369, Bell 206 and Hiller FH-1100. The 250 Series has since been developed into multiple versions, including turbo-props and turbo-shafts, with over 90 applications. Over 30,000 examples have been produced and fleet operating hours exceed 207 million. It has been in widespread service in New Zealand since the 250-C18 was imported in the first Bell 206A in 1968. (See the TCDS Note 11 for model differences.)

The 250-C300/A1 is a new derivative of the Model 250 Series II developed especially for the Robinson R66 helicopter, with reduced MGT ratings and limits which derate it to 300 shp for takeoff and a maximum continuous of 240 shp. It is essentially the same as earlier 250 Series II except the 6-stage axial compressor and centrifugal compressor combination has been replaced by a single centrifugal compressor. This has been scaled down from similar compressors used on the Model 250 Series III and IV approved under FAA Type Certificate E1GL. Other changes include a single outlet exhaust; engine-supplied starter-generator/GCU; and an Engine Monitoring Unit and related sensors. A second version is the 250-C300/B1 which does not yet have any application. The only difference is that the /A1 has two separate fuel control levers on the FCU, so the R66 could retain the separate fuel shut-off used on the R22/44.

To complete the exercise after initial type acceptance of the 250-C300/A1 engine (to facilitate the first delivery of a Robinson R66 helicopter on the New Zealand Civil Aircraft Register) a team of certification specialists from the CAA Aircraft Certification Unit visited Rolls Royce Corporation in Indianapolis for a validation/familiarisation visit. (See Minutes of Meeting dated 3 May 2011.)

This report was raised to Revision 1 to update to the latest format which now lists all engine models covered by the type acceptance certificate.

#### 4. NZCAR §21.43 Data Requirements

The type data requirements of NZCAR Part 21B Para §21.43 have been satisfied by supply of the following documents, or were already held by the CAA:

(1) State-of-Design Type certificate:

FAA Type Certificate Number E4CE

FAA Type Certificate Data Sheet number E4CE at Issue 27 dated 29 June 2010

- Model 250-C18, C18A approved September 9, 1965
- Model 250-C18B approved S, 19
- Model 250-C18C approved September 25, 1967
- Model 250-C20 approved April 22, 1970
- Model 250-C20B approved February 28, 1974
- Model 250-C20C approved F, 197
- Model 250-C20F approved March 2, 1979
- Model 250-C20J approved September 15, 1981
- Model 250-C20R/1 approved September 12, 1986
- Model 250-C20R/2 approved March 5, 1987
- Model 250-C20R/4 approved December 5, 1989
- Model 250-C20W approved April 20, 1990
- Model 250-C300/A1 approved 21 December 2007
- Model 250-C300/B1 approved 22 June 2009

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the Rolls Royce 250 Series I/II is CAR Part 13 effective June 15, 1956, as amended by 13-1, 13-2 and 13-3. For the 250-C300 Series this has been updated to FAR Part 33 effective February 1, 1965, including Amendments 33-1 through 33-4, plus Amendment 9 Section 33.4 (ICA). (See Issue Paper G1) One exemption was granted, which has been reviewed and accepted by the CAA.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1, because FAR Part 33 is the basic standard for engines called up under Part 21 Appendix C and CAR Part 13 was its predecessor. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23.

(ii) *Special Conditions:*

Nil

(iii) *Equivalent Level of Safety Findings:*

Nil

(iv) *Exemptions:*

Exemption 219A: (Regulatory Docket 26072[1337]) allows for approval of the 250 Series type design without the engine having at least two igniters and two secondary electric ignition circuits. This was justified because the unique design uses a single combustion chamber and a

single fuel nozzle. This arrangement is not subject to flame propagation problems associated with multiple chambers. Exemption 219B was subsequently issued to remove the Transport Category A limitation, based on over 20 years of flight experience and 51 million flight hours with no recorded in-flight shutdowns due to failure of an ignition system component.

(v) *Airworthiness Limitations:*

Life limits for rotating components are specified in the applicable O&M Manual

(3) Aircraft Noise and Engine Emission Standards:

(i) *Environmental Standard:*

The 250-C300 Series has been type certificated under the Fuel Venting and Exhaust Emissions Standards of FAR Part 34, including Amendments 34-1 through 34-3.

(ii) *Compliance Listing:*

EDR 22089 – Model 250-C300 Engine Fuel Venting and Exhaust Emissions Report . There are no regulatory limits established for turbo-shaft engines (or turbo-prop engines less than 1340 shp) for either emissions or fuel venting.

(4) Certification Compliance Listing:

EDR 22090 – Model 250-C300/A1 FAA Certification Compliance Summary Report – Initial issue dated 21 December 2007

(5) Flight Manual: Not Applicable

(6) Operating Data for Engine:

(i) *Maintenance Manual:*

5W2 – Operation and Maintenance Manual 250C18/A/B/C

10W2 – Operation and Maintenance Manual 250-C20/B/F/J/S/W

CSP21007 – Operation and Maintenance Manual 250-C20R/1/2/4

CSP21009 – RR300 Series Operation and Maintenance Manual

CSP22003 – RR300 Series Engine Maintenance Manual

(ii) *Current service Information:*

Service Bulletins and Notices to Operator

(iii) *Illustrated Parts Catalogue:*

CSP23004 – RR300 Line Illustrated Parts Catalog

CSP23006 – RR300 Shop Engine IPC

(7) Agreement from manufacturer to supply updates of data in (5), and (6):

Rolls Royce has provided access to FAST (Fleet Administrative Service Tool)

(8) Other information:

Installation Design Manual – RR300/A1 – Publication Reference: CSP24013

CSP22006 – 250 / RR300 Series Standard Practices Manual

## Attachments

The following documents form attachments to this report:

Copy of FAA Type Certificate Data Sheet Number E4CE

### Sign off

A blue ink signature of David Gill is written over a circular stamp from the Civil Aviation Authority of New Zealand. The stamp contains the text 'CIVIL AVIATION AUTHORITY OF NEW ZEALAND' and the number '0053'.

.....  
David Gill  
Team Leader Aircraft Inspection

A black ink signature of Gaetano Settineri is written over a circular stamp from the Civil Aviation Authority of New Zealand. The stamp contains the text 'CIVIL AVIATION AUTHORITY OF NEW ZEALAND' and the number '5022'.

.....  
Checked – Gaetano Settineri  
Certification Engineer

## Appendix 1

### List of Type Accepted Variants:

| <i>Model:</i>              | <i>Applicant:</i>                     | <i>CAA Work Request:</i> | <i>Date Granted:</i> |
|----------------------------|---------------------------------------|--------------------------|----------------------|
| 250-C18, C18A, C18B, C18C  | AC 21-1.2/NZCAR Part 21 Appendix A(c) |                          |                      |
| 250-C20, C20B, C20F        | AC 21-1.2/NZCAR Part 21 Appendix A(c) |                          |                      |
| 250-C20J, C20W             | AC 21-1.2/NZCAR Part 21 Appendix A(c) |                          |                      |
| 250-C20R/1, C20R/2, C20R/4 | AC 21-1.2/NZCAR Part 21 Appendix A(c) |                          |                      |
| 250-C300/A1, 250-C300/B1   | Rolls Royce Corporation               | 11/21B/22                | 13 April 2011        |