Type Acceptance Report

TAR 19/21B/6

CFM56-3 Series

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Executive Summary

New Zealand Type Acceptance has been granted to the CFM56-3 Series turbofan engines based on validation of EASA Type Certificate number E.066 and FAA type certificate number E2GL. There are no special requirements for import.

Applicability is limited to the Models and/or serial numbers detailed in Appendix 1, which are now eligible for installation on a NZ-registered aircraft. Additional variants or serial numbers approved under the foreign 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.19/21B/6 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 product 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 engine models included under the State-of-Design type certificate that have been granted type acceptance in New Zealand.

2. Product Certification Details

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

Type Certificate Holder: CFM International, S.A.

Type Certificate: E.066
Issued by: European Aviation Safety Agency

Type Certificate: E2GL
Issued by: Federal Aviation Administration

Manufacturer: General Electric
Production Approval: FAA PC 108

Manufacturer: Safran Aircraft Engines (Formerly SNECMA)
Production Approval: FR.21G.0007

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

(i) **Models:** CFM56-3

CFM56-3B

CFM56-3C

3. Application Details and Background Information

The first application for New Zealand type acceptance of the CFM56-3 Series engine was included as part of the first-of-type airworthiness certificate issue for the first 737-300 for Polynesian Airlines under NZCAR B.9 in 1992. The CFM56-3 is a high by-pass ratio axial-flow twin-spool turbofan, including a one-stage fan; three-stage low pressure compressor (LPC); nine-stage high pressure compressor (HPC); single annular combustor; single-stage high pressure turbine (HPT); four-stage low pressure turbine (LPT); and a hydro-mechanical main engine control (MEC) with limited authority electronic power management control (PMC).

The initial issue of this report separated out the engine from the 737-300 type acceptance report and added the CFM56-3C Series and any other variants on the type certificate not previously covered. The applicant was the type certificate holder dated 31 May 2018.

Type Acceptance Certificate Number 19/21B/6 was granted on 14 September 2018 to the CFM56-3 Series based on validation of EASA Type Certificate E.066 and FAA Type Certificate E2GL. There are no special requirements for import into New Zealand.

The CFM56 Series was developed as a joint venture between General Electric Aviation of the USA and SNECMA of France, with GE developing the high pressure compressor, combustor and high pressure turbine, and SNECMA developing the fan, low pressure compressor and low pressure turbine. The engine first ran in 1974 and the initial CFM56-2 model was used for retrofitting of turbojet powered transports and military tanker aircraft.

The CFM56-3 was a reduced thrust version developed specifically for the Boeing 737-300 with reduced fan diameter and relocated accessories, to fit under the wing, and was certificated in 1984. The CFM56-3 sub-variants are physically identical. The designation is defined by the thrust rating which is determined (or changed) by the ID plug.

GE Aviation and SNECMA both manufacture the engines under their own type certificate under licence from the type certificate holder, CFM International, who is responsible for type certification and customer support. The individual engine comes under the State-of-Design type certificate for whichever country in which it is produced. Engine variants produced under either type certificate are identical and interchangeable.

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:

EASA Type Certificate E.066 (replacing DGAC Type Certificate No. M9)
EASA Type Certificate Data Sheet E.066 Issue 01 dated 28 November 2008

FAA Type Certificate E2GL issued 12 January 1984
FAA Type Certificate Data Sheet No.E2GL at Revision 11 dated April 5, 2007
- – Model CFM56-3 approved 12 January 1984
- – Model CFM56-3B approved 19 June 1984
- – Model CFM56-3C approved 18 December 1986

(2) Airworthiness design requirements:

(i) Airworthiness Design Standards:
FAA TC E2GL – The certification basis of the CFM56-3 Series is 14 CFR Part 33, effective February 1, 1965, with Amendments 33-1 through 33-6. Three exemptions were granted by the FAA, which were reviewed and accepted by the CAA.

EASA TC E.066 – The certification basis was of the CFM56-2/3 was JAR-E Change 2 (18 August 1975 – based on BCAR Section C, Issue 9) as amended by BCAR Papers N° 560, N° 625 and N° 627 (all dated 18 August 1975).

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1A, because JAR E is equivalent to FAR 33, which is the basic standard for Aircraft Engines called up under Part 21 Appendix C. 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 (FAA Type Certificate only):
Exemption 2641 FAR §33.88 – This allowed a 5-minute test at maximum rated speed with gas temperature 75°C above the operating limit in lieu of the full 30 minutes test on the basis this was sufficient to allow evaluation of rotor creep and elongation characteristics that could lead to failure. This exemption anticipated a future Rule change.

Exemption 2850 FAR §33.7 – This permits use of an on-condition and condition monitoring maintenance program instead of the establishment of a fixed limitation for time before first overhaul.

Exemption 83-ANE-001E FAR §33.14 – The Rule requires a service life operating limitation to be established for each rotor disc and spacer in the compressor and turbine based on a number of start-stop stress cycles. The exemption allowed the use of a distribution of flight cycle profiles representative of engine usage over a range of operating conditions.

(v) Airworthiness Limitations:
See Chapter 5 Airworthiness Limitations section of the applicable Shop Manual

(3) Environmental Certification:

FAA TC E2GL – The CFM56-3 Series complies with the fuel venting and emissions requirements of SFAR No. 27-5.

EASA TC E.066 – ICAO Annex 16, Volume II, First Edition, 18th February 1982.

(4) Certification Compliance Listing:

CFM56-3 Compliance Check List Submittals dated January 12, 1984

(5) Flight Manual: N/A

(6) Operating Data for Engine:

(i) Maintenance Manual:
CFM56-3 Engine Shop Manual – TP.SM.5
CFM56-3 Engine Maintenance Manual – TP.MM.6
CFM56-3 Standard Practices Manual – SP.02
CFM56-3 Consumable Products Manual – CPM.03
CFM56-3 Illustrated Tools & Equipment Manual – ITEM.10
CFM56-3 Non-Destructive Test Manual – NDTM.11

(ii) Current service Information:
CFM56-3 Service Bulletins

(iii) Illustrated Parts Catalogue:
CFM56-3 Illustrated Parts Catalog – PC.08

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

CFM now provides access through the Customer Web Center
https://cwciportal.cfm56.com

(8) Other information:

Installation Manual – CFM 2031 (CFM56-3)
– CFM 2068 (CFM56-3B)
– CFM 2095 (CFM56-3C)

Specific Operating Instructions – TP.OI-9

Attachments

The following documents form attachments to this report:

Copy of EASA Type Certificate Data Sheet Number E.066
Copy of FAA Type Certificate Data Sheet Number E2GL

Sign off

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David Gill	Checked – Greg Baum
Team Leader Airworthiness	Airworthiness Engineer

Appendix 1

List of Type Accepted Variants:

Model:	*Applicant:*	*CAA Work Request:*	*Date Granted:*
CFM56-3B, -3C	AC 21-1.2/NZCAR Part 21 Appendix A(c)		11 May 1992
CFM56-3	CFM International S.A.	19/21B/6	14 September 2018