
Type Acceptance Report

TAR 20/21B/3

GENERAL ELECTRIC CT7 Series

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1. INTRODUCTION	1
2. PRODUCT CERTIFICATION DETAILS	2
3. APPLICATION DETAILS AND BACKGROUND INFORMATION	3
4. NZCAR §21.43 DATA REQUIREMENTS	4
ATTACHMENTS	7
APPENDIX 1	7

Executive Summary

New Zealand Type Acceptance has been granted to the General Electric CT7 Series turboshaft engines based on validation of FAA Type Certificate number E8NE. There are no special requirements for import.

Applicability is limited to the Models and/or serial numbers listed in Section 2, which are now eligible for installation on a NZ-registered aircraft. This is determined by the coverage of the Instructions for Continued Airworthiness for each CT7 engine Series. Subsequent models approved under the FAA 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. 20/21B/3 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 models included under the State-of-Design type certificate which have been granted type acceptance in New Zealand, which are listed in Section 2. Appendix 1 lists the type acceptance history. This includes Models covered by the type acceptance certificate issued under Part 21B at Amendment 6 or later and Models which were accepted prior to that as part of an aircraft validation, plus Models which were accepted prior to Part 21B under NZCAR Section B.9 and are now type accepted under the transitional arrangements of Part 21 Appendix A(c).

2. Product Certification Details

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

Manufacturer: General Electric Company
Type Certificate: E8NE
Issued by: Federal Aviation Administration
Production Approval: FAA PC108

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

- (i) **Models:** CT7-2A, CT7-2D, CT7-2D1
CT7-5A2, CT7-5A3
CT7-7A, CT7-7A1
CT7-8, CT7-8A, CT7-8A1, CT7-8A5
CT7-8A6, CT7-8A7
CT7-8B, CT7-8B5
CT7-8E, CT7-8E5, CT7-8F, CT7-8F5
CT7-9B, CT7-9B1, CT7-9B2
CT7-9C, CT7-9C3, CT7-9D, CT7-9D2

3. Application Details and Background Information

There have been examples of the General Electric CT7 Series engine in New Zealand prior to Part 21B and Amendment 6, when there was no provision for separate type acceptance of products and the engine was included with the aircraft validation. The first application for separate New Zealand type acceptance under Part 21B was for the CT7-8 Series from the manufacturer dated 15 August 2019. The CT7 is a three-shaft high-bypass-ratio axial flow turboshaft with take-off power ratings in the 1600 to 2700 shp range.

Type Acceptance Certificate Number 20/21B/3 was granted on 26 March 2020 to the General Electric CT7-8 Series engines based on FAA Type Certificate E8NE. There are no special requirements for import into New Zealand.

The original CT7-1 turboshaft was a commercial derivative of the military T700 engine developed for the Sikorsky UH-60A Blackhawk helicopter. The first production models were the CT7-2A used on the Bell 214ST in 1981 and the CT7-2D on the Sikorsky S-70C helicopter. The most recent variants are the FADEC-controlled CT7-2E1 for the Leonardo AW189, and CT7-2F1 for the Bell 525. The CT7-6 was developed for the EH101 helicopter, while the CT7-8A was selected to power the Sikorsky S-92A helicopter.

The CT7-8 had a new Intermediate Power Section and compressor for increased airflow, FADEC control system and improved Gas Generator Turbine and Power Turbine. There have since been a series of CT7-8A/B/E/F Growth variants, based on increased redlines, GGT and material upgrades, and improved engine cooling. (Each variant has its own unique FADEC software to accommodate specific Np speed and horsepower ratings.)

GE also developed a turboprop version of the engine, the main technical difference being a propeller gearbox developed by Hamilton Sundstrand. The first airframe application was the CT7-5A2 used on the Saab SF340A and the CT7-7A used on the CASA CN235, while the CT7-9B was an increased performance development for the Saab 340B.

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) ICAO Type certificate:

FAA Type Certificate Number E8NE

FAA Type Certificate Data Sheet number E8NE at Revision 38 dated 20 May 2019

- Model CT7-2A approved May 28, 1981
- Model CT7-5A2 approved March 25, 1985
- Model CT7-2D approved August 22, 1985
- Models CT7-9B and CT7-9C approved June 17, 1988
- Models CT7-5A3 and CT7-7A1 approved March 16, 1989
- Model CT7-2D1 approved June 30, 1989
- Models CT7-9B1/-9B2 and -9D approved June 24, 1992
- Models CT7-9C3 and CT7-9D2 approved June 25, 1998
- Model CT7-8 approved September 29, 2000
- Models CT7-8A/8A5/8B/8B5/8E/8E5/8F/8F5 approved April 8, 2004
- Model CT7-8A1 approved June 21, 2010
- Models CT7-8A6 and CT7-8A7 approved May 21, 2012

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the first General Electric CT7-2 Series is FAR Part 33, effective February 1, 1965, as amended by amendments 33-1 through 33-5, plus one Special Condition. A similar basis was used for the later CT7-5, CT7-6 and CT7-9 Series, except for some individual paragraphs at a later Amendment date. The CT7-8 certification basis was updated to include up to Amendment 33-19, plus some Special Conditions. All subsequent CT7- variants were type certificated to Part 33 up to Amendment 33-20 plus some Special Conditions and an Equivalent Level of Safety Finding, as detailed on the TCDS. The Special Conditions and ELOS have been reviewed and accepted by CAANZ.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1A, as FAR 33 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:*

(CT7-2 and CT7-6 Series):

33-76-NE-2 Fire Prevention – The CT7-1 engine has surface temperatures that are higher than those in most current engines and which present an increased probability of the ignition of leaking flammable fluids. The Special Condition required that each external line, fitting, and other component, which contains or conveys flammable fluid must be fire resistant. Components must be shielded or located to safeguard against the ignition of leaking flammable fluid.

(CT7-5, CT7-7 and CT7-9 Series):

33-NE-1 Propeller Ground Locking – CT7-5A and-7 turboprop engines incorporate a brake which will allow the propeller to be stopped, and remain stopped while the gas generator section remains in operation as an auxiliary power unit ("APU Mode"). The Special Condition introduced new requirements for this mode including: 45 hours ground locked running with the propeller brake engaged; 400 application-release cycles of dynamic braking engagement with the engine under the maximum torque, temperature, speed and acceleration; and 100 engine stop/starts in APU mode.

(CT7-8 Series):

33-002-SC for 30-second and 2-minute OEI ratings – In addition to §33.4, the mandatory inspection and maintenance actions required following the use of the 30-second or 2-minute OEI rating must be included in the airworthiness limitations section of the appropriate engine manuals. In addition to § 33.27(b), turbine and compressor rotors must have sufficient strength to withstand the conditions specified in several alternative test regimes.

(CT7-8):

33-003-SC for 30-minute rating – Again, in addition to §33.4, the Instructions for Continued Airworthiness (ICA) procedures must ensure that the engine deterioration in service will not exceed the level shown in certification using the rated 30-minute power, and also be included in the airworthiness limitations section of the ICA. In addition to the ratings provided in §33.7, a rated 30-minute power rating is defined, with some additional Endurance Test requirements specified.

(CT7-8A/B/E/F Series):

33-005-SC for 30-minute AEO, Continuous OEI rating – Similar to the above ratings this called up the same requirements for the ICA, defined the new power ratings under §33.7, and specified additional periods and cycles for the Endurance Test required by §33.87(c) and (d).

(iii) *Equivalent Level of Safety Findings:*

(CT7-8A6 and 8A7):

ELOS No. 8040-ELOS-12-NE04 – This was granted against the endurance test requirements of §33.87(d), (f) due to a need to replace the stage 1 high pressure turbine (HPT) blades to complete two remaining cycles out of 25 required endurance test cycles. GE determined the root cause was inadequate cooling. GE proposed to use replacement conforming blades which had already run a full 150 endurance test hours on another model, plus some additional compensating factors.

(iv) *Airworthiness Limitations:*

See the applicable GE Maintenance Manual Chapter 5

(3) Environmental Certification:

All the CT7 Models meet the fuel venting and smoke requirements of FAR Part 34 as amended by Amendment 34-4. This is the same as ICAO Annex 16, CAEP4 (required for EASA certification via CS-E 1010).

(4) Certification Compliance Listing:

CT7-8 Cert Compliance Checklist

CT7-8 Growth Cert Compliance Checklist

CT7-8A6/-8A7 Cert Compliance Checklist

(5) Flight Manual: N/A

(6) Operating Data for Engine:

(i) *Maintenance Manual:*

CT7-2A, CT7-2D/2D1 Maintenance Manual – Publication SEI-570

CT7-5A2/5A3, CT7-7/7A1 Maintenance Manual – Publication SEI-576

CT7 Turboprop Engine – CT7-5A2/-5A3, CT7-7A/-7A1, CT7-9B/-9B1/-9B2,
CT7-9C/-9C3, CT7-9D/-9D2 Shop Manual – Publication SEI-578

CT7-8 Turboshaft Engine Maintenance Manual – Publication GEK105159

CT7-8/-8A Time Limited Dispatch Summary – Publication GEK 112652

GE Commercial Engine Standard Practices Manual – Publication GEK9250

(ii) *Current service Information:*

Service Bulletins (SB)

Commercial Engine Service Memorandum (CESM)

(iii) *Illustrated Parts Catalogue:*

CT7 Turboshaft CT7-2A Illustrated Parts Catalogue – Publication SEI-571

CT7-2D, CT7-2D1 Illustrated Parts Catalogue – Publication SEI-690

CT7-5A2/5A3, CT7-7/7A1 Illustrated Parts Catalogue – Publication SEI-577

CT7-8 Engine Illustrated Parts Catalogue – Publication GEK105158

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

GE provides access through the Customer Portal www.myGEAviation.com

(8) Other information:

CT7-2A/2D/2D1 Operating Instructions – Publication SEI-569

CT7-TP 5-7 Operations Engineering Bulletins

Attachments

The following documents form attachments to this report:

Copy of FAA Type Certificate Data Sheet Number E8NE

Sign off



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David Gill
Team Leader Airworthiness



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Checked – Greg Baum
Acting Team Leader Product Certification

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
CT7-2A	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
CT7-5A2	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
CT7-9B	SAAB Aircraft AB	96/21B/10	29 April 1996
CT7-8 Series	General Electric Company	20/21B/3	26 March 2020