Type Acceptance Report

TAR 16/21B/1

PRATT & WHITNEY CANADA PT6A-114/135/140 SERIES

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Executive Summary

New Zealand Type Acceptance has been granted to the Pratt & Whitney Canada PT6A Series based on validation of Transport Canada Type Certificate number E-15. 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(b).

NOTE: The information in this report is correct as at the date of issue. The report is 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 State-of-Design Type Certificate Data Sheet.

1. Introduction

This report details the basis on which Type Acceptance Certificate No.16/21B/1 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. Models covered by the type acceptance certificate issued under Part 21B are listed in Section 2 of this report. Models which were accepted prior to that as part of a previous aircraft type acceptance certificate or under NZCAR Section B.9 are listed in Appendix 1.

2. State-of-Design Type Certificate Details

Manufacturer:	Pratt & Whitney Canada Corporation
Type Certificate:	E-15
Issued by:	Transport Canada
Models:	PT6A-112, -114, -114A PT6A-135A PT6A-140, -140A, -140AG

3. Type Acceptance Certificate

The initial application for New Zealand type acceptance of the PT6A-140 Series was from the manufacturer, dated July 15, 2015. The PT6A turboprop family is a free turbine design and is covered by a range of type certificates. The PT6A-100 is one of the "small" series (600-1075 shp range), and consists of a two-stage reduction gearbox, single-stage power turbine, single-stage gas generator turbine and 4-stage gas generator compressor (3 axial, 1 centrifugal), with a single annular reverse-flow combustion chamber. The fuel control is hydro-mechanical and a common accessory gearbox design is used for all the PT6A-100 series. The engines are usually mounted in the airframe with the air intake at the rear.

Type Acceptance Certificate No. 16/21B/1 was granted on 7 March 2016 to the Models PT6A-140, PT6A-140A and PT6A-140AG based on validation of Transport Canada Type Certificate number E-15. There are no special requirements for import.

The first PT6A version covered by Type Certificate E-15 was the 750 shp PT6A-135 used on the PA-31T2 Cheyenne IIXL (de-rated to 620 shp). This engine was derived from the PT6A-34 and used a 1900 RPM gearbox and an improved hot section. The next was the 500 shp PT6A-112 used on the Cessna 425 Conquest I. The 600 shp PT6A-114 developed for the Cessna 208 Caravan was similar but used a single exhaust port. This was evolved into the 675 shp PT6A-114A using the increased flow compressor from the PT6A-135A.

The 867 shp PT6A-140 is a derivative of the PT6A-114A, but with considerable changes to achieve the power increase. It has a single port exhaust similar to the PT6A-114A, with revised gas generator and exhaust duct cases and the same propeller governor. The turbomachinery (compressor and power turbine disc and vane assemblies, combustion liner assembly with minor changes) is based on the PT6T-9 turboshaft engine. A new reduction gearbox is used along with the accessory gearbox from PT6A-42, with a design change for starter electrical discharge protection. The fuel control unit with manual override is based on the PT6A-67P model, and there are new external tubes/firewalls to suit the installation. The PT6A-140A is the same but with a standard twin port exhaust duct.

4. Type Data

The type data requirements of NZCAR Part 21B Para §21.43 have been satisfied by supply of the following documents:

(1) State-of-Design Type certificate:

Transport Canada Type Certificate Number E-15

Transport Canada Type Certificate Data Sheet E-15 at Issue 19 dated Dec 19, 2014
- Model PT6A-112 approved November 30, 1978
- Model PT6A-135A approved April 15, 1982
- Model PT6A-114 approved March 12, 1984
- Model PT6A-114A approved November 22, 1989
- Model PT6A-140 approved May 30, 2012
- Model PT6A-140A approved December 19, 2014
- Model PT6A-140AG approved December 19, 2014

(2) Airworthiness design requirements:

(i) Airworthiness Design Standards:
The certification basis of the PT6A-112/114/114A/135A Series is FAR Part 33 including Amendments 33-1 through 33-5. For the PT6A-140/A/AG this was updated to Canadian Airworthiness Manual, Chapter 533 Change 533-8, dated December 2006. (This is equivalent to FAR Part 33, Amendment 20.)

These are both acceptable because FAR Part 33 is the basic standard for aircraft engines called up under Part 21 Appendix C. There are no non-compliances and no special conditions have been prescribed by the Director under §21.23.

(ii) Special Conditions:
Nil

(iii) Equivalent Level of Safety Findings:
Nil

(iv) Airworthiness Limitations:
MM 3075742 Airworthiness Limitations Section defines the Rotor Components Service Lives for the PT6A-140.

SB1903 defines the Operating Time Between Overhaul (TBO) and Hot Section Inspection (HSI) frequency for the PT6A-140.

MM 3077182 Airworthiness Limitations Section defines the Rotor Components Service Lives, and the TBO and HSI frequency for the PT6A-140A.

MM 3079582 Airworthiness Limitations Section defines the Rotor Components Service Lives, and the TBO and HSI frequency for the PT6A-140AG.

(3) Environmental Certification:

(i) Environmental Standard:
The PT6A-140 Series engines comply with Canadian Airworthiness Manual Chapter 516 – Aircraft Engine Emissions, at change 516-10. (Equivalent to ICAO Annex 16, Amendment 6 to Volume II.)

(ii) Compliance Listing:
P&WC Engineering Rpt No. 7528 – PT6A-140 Smoke and Emissions Test Report

P&WC Engineering Report No. 8579 – PT6A-140A,140AG Smoke and Emissions

(4) Certification Compliance Listing:

Pratt & Whitney Canada Engineering Report No. 7484 – Section I, Table 2 Compliance Summary Table (PT6A-140)

Pratt & Whitney Canada Engineering Report No. 8451 – Section I, Table 2 Compliance Summary Table (PT6A-140A)

Pratt & Whitney Canada Engineering Report No. 8450 – Section I, Table 2 Compliance Summary Table (PT6A-140AG)

Summaries for PT6A-140 Engineering Reports (ER):
- P&WC Engineering Report No. 7529 Fire Safety Report
- P&WC Engineering Report No. 7530 Certification Endurance Report
- P&WC Engineering Report No. 7531 Containment Report
- P&WC Engineering Report No. 7532 Structural Analysis Report
- P&WC Engineering Report No. 7533 Lubrication System Report
- P&WC Engineering Report No. 7535 Operations Test Report
- P&WC Engineering Report No. 7536 Rotor Overspeed Report
- P&WC Engineering Report No. 7538 System Safety Analysis
- P&WC Engineering Report No. 7542 Vibration Report
- P&WC Engineering Report No. 7543 Low Cycle Fatigue Report
- P&WC Engineering Report No. 7545 Fuel System Report
- P&WC Engineering Report No. 7547 Induction System Icing Report
- P&WC Engineering Report No. 7549 Foreign Object Ingestion Report
- P&WC Engineering Report No. 7550 Overtemperature Report
- P&WC Engineering Report No. 7551 Initial Maintenance Inspection Interval
- P&WC Engineering Report No. 8006 Overtorque Report

Summaries for PT6A-140A, 140AG Engineering Reports (ER):
- P&WC Engineering Report No. 8573 Cert Endurance Report
- P&WC Engineering Report No. 8574 Structural Analysis Report
- P&WC Engineering Report No. 8576 Overtemperature report
- P&WC Engineering Report No. 8628 PT6A-140A Low Cycle Fatigue Report
- P&WC Engineering Report No. 8572 PT6A-140AG Low Cycle Fatigue Report

P&WC Engineering Report No. 7485 PT6A-140 Installation Manual

(5) Flight Manual: Not Applicable

(6) Operating Data for Engine:

(i) Maintenance Manual:
PT6A-140 Maintenance Manual P/N 3075742
PT6A-140A Maintenance Manual P/N 3077182
PT6A-140AG Maintenance Manual P/N 3079582

PT6A-140 Overhaul Manual P/N 3075743
PT6A-140A Overhaul Manual P/N 3077183
PT6A-140 Overhaul Manual P/N 3079583

(ii) Current service Information:
PWC Service Bulletins, Spares Parts Bulletins and Service Information Letters are available on the Pratt and Whitney Canada website.

(iii) Illustrated Parts Catalogue:
PT6A-140 IPC P/N 3075744
PT6A-140A IPC P/N 3077184
PT6A-140AG IPC P/N 3079584

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

Form CAA 2171 from PWC Senior Project Engineer dated July 15, 2015

PWC now provides CAA access to technical publications on their website: https://eportal.pwc.ca

Attachments

The following documents form attachments to this report:

Copy of Transport Canada Type Certificate Data Sheet Number E-15

Sign off

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David Gill	Checked – Jason Ashworth
Team Leader Airworthiness	Airworthiness Engineer

Appendix 1

List of Type Accepted Variants:

Model:	*Applicant:*	*CAA Work Request:*	*Date Granted:*
PT6A-112	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
PT6A-114/114A	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
PT6A-135A	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
PT6A-140/140A/140AG	Pratt & Whitney Canada Corp.	16/21B/1	7 March 2016