
Type Acceptance Report

TAR 18/21B/19

PRATT & WHITNEY CANADA PW210 Series

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Executive Summary

New Zealand Type Acceptance has been granted to the Pratt & Whitney Canada PW210 Series turboshaft engine based on validation of Transport Canada Type Certificate number E-36. 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.18/21B/19 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.

2. Aircraft Certification Details

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

Manufacturer:	Pratt & Whitney Canada Corporation
Type Certificate:	E-36
Issued by:	Transport Canada
Production Approval:	Certificate of Approval Number 4-58

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

- (i) Models: PW210A
PW210S

3. Application Details and Background Information

The initial application for New Zealand type acceptance of the PW210 Series was from the engine manufacturer, Pratt & Whitney Canada, dated 11 September 2017. The PW210 is a new lightweight free turbine turboshaft engine in the 1000 shp power class intended for multiple engine installations on Transport Category helicopters. It was developed in partnership with Mitsubishi Heavy Industries, who are responsible for the design and development of the Power Turbine Module with the exception of the Power Turbine discs.

Type Acceptance Certificate Number 18/21B/19 was granted on 18 December 2017 to the Model PW210 Series based on validation of Transport Canada Type Certificate E-36. There are no special requirements for import for any engine variant.

The PW210 is a dual-channel FADEC-controlled turboshaft developed using features from the PT6, PW200 and PW600 engine families. A two-stage compressor incorporates a single Mixed Flow Rotor (1M) and a single Centrifugal Rotor (1C) driven by a single stage High Pressure Turbine. A two stage Power Turbine drives the Helicopter Rotor system through a single stage Reduction Gearbox. The gearbox incorporates a phase shift torque meter device with sensors which provide inputs to the EEC and an accurate cockpit indication of engine torque. Metered fuel from the Fuel Control Unit (FCU) is sprayed into a reverse flow annular combustion chamber through thirteen (13) individual fuel nozzles mounted around the gas generator case. A Full Authority Digital Electronic Control (FADEC) system that consists of a Fuel Control Unit (FCU), an Inlet Guide Vane Actuator (IGVA) and an Engine Electronic Control (EEC) modulate the engine power.

The PW210S was first developed for use on the Sikorsky S-76D helicopter. The PW210A is a derivative model and is fitted to the Leonardo AW169 helicopter. The PW210A engine incorporates the following major changes relative to the PW210S engine:

- Flat 30sec/2minute OEI rating structure.
- New Single Stage RGB with output shaft speed of 14,400 rpm (PW210S = 6409).
- Gimbal Front Mount and Relocated Rear Mounts.
- Provisions for Intermediate Fragment Containment.
- APU Mode Operation (Free PT – No Rotor Brake).
- New EEC software to suit the new application.
- Engine external modifications to meet installation requirements.

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:

(1) State-of-Design Type certificate:

Transport Canada Type Certificate Number E-36

Transport Canada Type Certificate Data Sheet no. E-36 at Issue 8 dated 13.08.2015

– Model PW210S approved October 14, 2011

– Model PW210A approved July 11, 2014

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the PW210 series is the Canadian Airworthiness Manual (AWM) Chapter 533 – *Aircraft Engines* at Change 533-12. This is equivalent to FAR Part 33 at Amendment 33-30, which is the basic airworthiness design standard for aircraft engines called up under Part 21 Appendix C. Four special conditions were applied, and one equivalent safety finding made. These have been reviewed and accepted by the CAA. There are no non-compliances and no special conditions have been prescribed by the Director under §21.23.

(ii) *Special Conditions:*

PW210S and PW210A:

SCA 2007-09 New Engine Rating: 30 Minute Hovering Power – This is intended for hovering at increased power for search and rescue missions. In the past it has been determined that 25 hours of operation at the 30 Minutes Hovering Rating would adequately cover endurance test requirements. Full limitations for the ratings must be established, and in addition to the requirements of AWM 533.87 in each of the required twenty five 6-hour endurance test cycles, two periods of 30 minutes each shall be run at the rated 30-Minute Hovering Power.

PW210S:

SCA 2007-02 Engine Operation in Auxiliary Power Unit (APU) Mode – The ability to operate a helicopter engine on the ground with the rotor stopped was considered a novel design feature. These Special Conditions specified tests to determine the effect of operating in APU mode, similar to the turboprop related tests of AWM 533.96. The additional requirements included: 45 hours with the output shaft locked; one hundred engine starts and stops with the output shaft locked; followed by strip inspections; and determination of the effect of brake engagement and release.

PW210A:

SCA 2014-03 New Engine Rating: Flat 30 Second and 2 Minute OEI Power – The PW210A combined two existing ratings into this one to allow the continuation of flight following engine failure or shut-down for up to three periods of use at maximum OEI power, no longer than 2.5 minutes each, in any one flight followed by mandatory inspection and maintenance action. This is similar to the 2.5 minute OEI rating except that the Flat 30 sec/2minute one is a damaging rating.

(iii) *Equivalent Level of Safety Findings:*

AWM 533-71(c)(8) Oil Tank Shut-Off Valve – There must be a shut-off valve at the outlet of each tank, unless the external portions of the oil system (including tank supports) is fireproof, to ensure no flammable fluid would feed an uncontrolled fire. The PW210S oil tank is fireproof and PWC will demonstrate that once the engine has stopped turning that wind-milling is not possible and oil will not flow from a breach if the Fuel Oil Heat Exchanger goose neck integrity is breached by a fire. This feature compensates for an oil tank shut-off valve and prevents oil from feeding a fire.

(iv) *Airworthiness Limitations:*

See the Airworthiness Limitations Section of the applicable Maintenance Manual.

(3) Environmental Certification:

The engines comply with Subchapter B of AWM Chapter 516 – *Aircraft Engine Emissions* for prevention of fuel venting at Change 516-10. (Equivalent to ICAO Annex 16 Volume II, and FAR Part 34)

(4) Certification Compliance Listing:

Pratt & Whitney Canada Inc. – Engineering Report No. 6420 Rev.A – PW210S Engine – Civil Certification Compliance Plan – October 2011

Pratt & Whitney Canada Inc. – Engineering Report No. 7424 Rev.A – PW210A Engine – Civil Certification Compliance Plan – May 2014

(5) Flight Manual:

Not Applicable.

(6) Operating Data for Engine:

(i) *Maintenance Manual:*

Maintenance Manual: Model PW210S Engines – Part Number 30L0892

Maintenance Manual: Model PW210A Engines – Part Number 30L2392

Overhaul Manual: Model PW210S Engines – Part Number 30L0893

Overhaul Manual: Model PW210A Engines – Part Number 30L2393

Installation Manual: Model PW210S Engines – Part Number 30L2170 (ER6421)

Installation Manual: Model PW210A Engines – Part Number 30L2374 (ER7434)

(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:*

Illustrated Parts Catalog: Model 210S Engines – Part Number 30L0894

Illustrated Parts Catalog: Model 210A Engines – Part Number 30L2394

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

See P&WC/Transport Canada Coordination Memo number PW210-17-003

CAA 2171 Form from PW210 Project Engineer dated 11 Sept 2017

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-36

Sign off

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David Gill
Team Leader Airworthiness

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Checked – Greg Baum
Airworthiness Engineer

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
PW210A, PW210S	Pratt & Whitney Canada Corp.	18/21B/29	18 December 2017