
Type Acceptance Report

TAR 17/21B/27 – Revision 1

PRATT & WHITNEY CANADA PW100 Series

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Executive Summary

New Zealand Type Acceptance has been granted to the Pratt & Whitney Canada PW100 Series turboshaft engines based on validation of Transport Canada Type Certificate number E-19. There are no special requirements for import.

All models on the current type certificate are now type accepted. Any new variants approved under the Transport Canada 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. 17/21B/27 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 covers all models included on the State-of-Design type certificate which have been granted type acceptance in New Zealand. Appendix 1 details which models were type accepted under Part 21B at Amendment 5 or earlier, when there was no provision for separate type acceptance of engines and propellers (those products were then included in an aircraft type acceptance report), and which models were certificated prior to 1 July 1995 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: Pratt & Whitney Canada Corporation

Type Certificate: E-19

Issued by: Transport Canada

Production Approval: Certificate of Approval Number 4-58

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

(i) Models: PW118/118A/118B
PW119A/119B/119C
PW120/120A
PW121/121A
PW123/123AF/123B/123C/123D/123E
PW124B
PW125B
PW126/126A
PW127/127A/127B/127C/127D/127E
PW127F/127G/127H/127J/127M/127N
PW127XT-L/PW127XT-M/127XT-N

3. Application Details and Background Information

The first application for New Zealand type acceptance of one of the PW120 Series engines was included as part of the first-of-type airworthiness certificate issue for the first two DHC-8-102 for Ansett New Zealand under NZCAR B.9 in 1986. Several other PW120 Series engine models have subsequently been validated as part of the airframe type acceptance for the DHC-8-300 and ATR72 aircraft. The Pratt & Whitney Canada PW100 series is a three spool free-turbine turboshaft engine incorporating two centrifugal compressors, each driven by independent axial turbines, a reverse flow annular combustor, and a two-stage power turbine driving an output gearbox. The PW100 Series includes a range of engine variants from 2000 shp to 3000 shp (the model designation refers approximately to the power output), and has captured a large share of the regional airliner engine market.

The initial application for New Zealand type acceptance of the PW125B was from the engine manufacturer, dated 30 May 2017. (The application was to support validation of the Fokker 50 in New Zealand.) The opportunity was taken to issue a separate type acceptance report for the PW120 Series and add all the Models on the type certificate.

Type Acceptance Certificate Number 17/21B/27 was granted on 31 August 2018 to the Pratt and Whitney Canada PW125B, and all the other PW120 Series Models which were not previously covered as part of an aircraft type acceptance, based on validation of Transport Canada Type Certificate number E-19. There are no special requirements for import for any engine variant.

The first of the PW100 series was the PW115 used on the Embraer EMB120 Brasilia, although this was superseded by the PW118 and has now been removed from the type certificate. The PW119 was used on the Dornier 328, while the PW120 was selected for the DHC8 aircraft, and also for the ATR42. There have also been a series of engine sub-variants to cater for airframe specific installation requirements. The PW100 had been designed with significant growth capability and the PW123, developed for the DHC-8-300 and also chosen for the CL215T, was the first such evolution. The main difference is the larger diameter higher pressure ratio LP compressor. The PW124 was selected for the first ATR72, while the PW125 was produced for the Fokker 50 and the PW126 fitted to the British Aerospace ATP. The next growth step was the PW127, developed for the hot and high version of the ATR72. Other PW127 variants have been adopted for the Chinese MA60, CASA C-295 and Russian Il-114. Most base engine models can be converted to a sub-variant by embodiment of a Service Bulletin. (See the TCDS for details.)

Revision 1 was issued to add the latest development PW127XT versions, as used on the ATR42/72 aircraft series. The aim of the XT program was to improve Specific Fuel Consumption (with a new LP Compressor with increased efficiency and flow) and to increase time-on-wing between shop maintenance (by a new HP Turbine Blade and Disc with improved cooling). There were also many other associated changes to maximise the gains and take advantage of current best practices. The applicant was the manufacturer and type acceptance was granted on 27 August 2024.

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-19

Type Certificate Data Sheet Number E-19 at Issue 51 dated August 28, 2023

- Model PW118 approved March 11, 1986
- Model PW118A approved June 30, 1987
- Model PW119 approved February 29, 1996
- Model PW119A approved March 4, 1992
- Model PW119B approved April 5, 1993
- Model PW119C approved April 21, 1995
- Model PW120 approved December 16, 1983
- Model PW120A approved September 18, 1984
- Model PW121 approved February 18, 1987
- Model PW121A approved March 24, 1995
- Model PW123 approved June 30, 1987
- Model PW123AF approved June 14, 1989
- Model PW123B approved December 20, 1991
- Models PW123C and PW123D approved May 13, 1994
- Model PW123E approved February 13, 1995
- Model PW124B approved May 25, 1988
- Models PW125B and PW126 approved May 1, 1987
- Model PW126A approved June 14, 1989
- Model PW127 approved February 4, 1992
- Model PW127A approved February 10, 1992
- Model PW127B approved November 5, 1992
- Model PW127C approved October 6, 1992
- Model PW127D approved March 31, 1993
- Model PW127E approved December 16, 1994
- Model PW127F approved August 30, 1996
- Model PW127G approved September 19, 1997
- Model PW127H approved October 23, 1998
- Model PW127J approved January 4, 1999
- Model PW127M approved December 7, 2007
- Model PW127N approved May 5, 2014
- Model PW127XT-M approved August 25, 2022
- Model PW127XT-N approved June 22, 2023
- Model PW127XT-L approved August 28, 2023

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The original certification basis of the PW120 series is FAR Part 33, effective February 1, 1965, including Amendments 33-1 through 33-9.

For the PW127XT Series, although it was classified as a Not Significant change, Pratt & Whitney Canada elected to update the certification basis to AWM Chapter 533 at Change 533-9, published on December 30, 2008, which is equivalent to FAR Part 33 up to and including Amendment 33-24, except for paragraph 533.27. This was at Change 533-13, published on July 13, 2014, which is equivalent to Part 33 at Amendment 33-32. One exemption was granted, which has been reviewed and accepted by CAA.

This is the basic airworthiness design 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:*

PW127N, PW127XT Series:

Transport Canada Letter dated September 20, 1983 – This added the provisions of a series of Transport Canada Engineering Issue papers which were a series of requirements that were contained in the foreign engine design standards (JAR-E) but were not yet in FAR 33 at Amendment 33-9. (They had been proposed under FAA NRPM 80-21 and were later added under Amendment 33-10.) For the PW127N and subsequent variants the provisions were incorporated into a formal Special Condition number SCA 2014-02.

(iii) *Equivalent Level of Safety Findings:*

Nil

(iv) *Exemptions:*

PW127XT Series:

NCR-054-2021 for AWM 533.27(f)(6) Loss of Load – This paragraph includes the following requirement: (f)(6) Failure of a shaft section may be excluded from consideration in determining the highest overspeed that would result from a complete loss of load on a turbine rotor if the applicant does not exclude the entire shaft. This exemption allows P&WC to field a HP rotor shaft system with safety-related improvements compared to the presently approved design. It was granted on the condition the engine design and supporting documentation shall meet the guidance defined in the AIA-CARS report titled “Guidance on exclusion of a High Pressure Turbine shaft element, section, or system from failure consideration in determining the terminal High Pressure Turbine rotor speed in the event of a complete loss of load event”. Life calculations performed in accordance with this report shall be performed using the most stringent factors. P&WC will also ensure the HP rotor shaft system design maintains a positive margin between the calculated life of the stubshaft portion of the part and its declared life.

(v) *Airworthiness Limitations:*

See the Airworthiness Limitations Section of the applicable Maintenance Manual or Airworthiness Limitations Manual.

(3) Environmental Certification:

PW127 Series up to PW127N:

Not Applicable to a turboshaft engine.

PW127XT Series:

AWM Chapter 516, Subchapter B for prevention of Fuel Venting at Change 516-15, which refers to ICAO Annex 16 Volume II, "Aircraft Engine Emissions", Fourth Edition, July 2017, as amended by and including Amendment 10. (Compliance with 14 CFR 34 up to amendment 34-5A, dated 23 October 2013 has also been demonstrated.)

(4) Certification Compliance Listing:

PW100 Series Type Approval Basis "Blue Book" – Engineering Report 4014

Pratt & Whitney Canada Inc. – Engineering Report No. 3928: Compliance Plan – PW124, PW124A, PW125B

Pratt & Whitney Canada – ER10001 Section I – PW127XT-M and PW127XT-N Engine Civil Certification Compliance Record – Compliance Summary – Rev.C

Pratt & Whitney Canada – ER10950 Section I – PW127XT-L Engine Civil Certification Compliance Record – Compliance Summary – Rev.A

(5) Flight Manual: N/A

(6) Operating Data for Engine:

(i) *Maintenance Manual:*

Maintenance Manual-Turboprop Gas Turbine Engine-Model(s) PW120A (Build Spec.632) and PW121 (Build Spec.717) – Manual Part No.3034632

Maintenance Manual-Turboprop Gas Turbine Engine-Model(s) PW123 (BS707), PW123B (BS785), PW123C (BS838), PW123D (BS839), PW123E (BS869) – Manual Part No. 3036432

Maintenance Manual-Model(s) PW124B (BS.724/726/896), PW127 (BS.774/897), PW127E (BS.850/1034), PW127F (BS.918/1033), PW127M (BS.1237) and PW127N (BS.1324) – Manual Part No.3037332

Maintenance Manual-Turboprop Gas Turbine Engine-Model(s) PW125B (Build Spec.647/794) and PW127B (Build Spec.812) – Manual Part No.3034932

Engine Maintenance Manual: Model Applicability: PW127XT-M/N/L (BS.1409) /PW127XT-N (BS.1472)/PW127XT-L (BS.1471) – Manual Part Number: 3136182 – Publication PW127-00198-0A401-00

Cleaning, Inspection and Repair Manual: Applicability: PW127XT-M/127XT-N Manual Part Number: 3136577 – Publication PW100-00198-A4005-00

(ii) *Current service Information:*

P&WC 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-Turboprop Gas Turbine Engine-Model(s) PW120A (Build Spec.632) and PW121 (Build Spec.717) – Manual Part No.3034634

Illustrated Parts Catalog-Turboprop Gas Turbine Engine-Model(s) PW123 (BS707), PW123B (BS785), PW123C (BS838), PW123D (BS839), PW123E (BS869) – Manual Part No. 3036434

Illustrated Parts Catalog-Turboprop Gas Turbine Engine-Model(s) PW124B (BS724/726/896), PW127 (BS774/897), PW127E (BS850/1034), PW127F (BS918/1033), PW127M (BS1237), PW127N (BS1324) – Manual Part No.3037334

Illustrated Parts Catalog-Turboprop Gas Turbine Engine-Model(s) PW125B (Build Spec.647/794) – Manual Part No.3034934

Engine Illustrated Parts Catalog: Model Applicability: PW127XT-L/M/N
Manual Part Number: 3136184 – Publication PW127-00198-0A403-00

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

See P&WC/Transport Canada Coordination Memo number PW300-15-020 – P&WC now provides CAA access to technical publications through their customer portal: <https://eportal.pwc.ca>

- Notes:
1. The manufacturer provides access to Technical Publications for specific engine variants to the CAANZ account on request.
 2. Type Acceptance covers all engine variants currently on the type certificate. However only those manuals applicable to engine variants currently on aircraft on the NZ Civil Aircraft Register are listed in the report above. See the TCDS for details of the manuals for all other engine variants.
 3. The TCDS includes some engine variants for which the Instructions for Continued Airworthiness have not yet been completed and accepted. (See details specified under Notes 19 and 20.) The condition in Note 20 on the TCDS that the engine may not be operated until the ICA have been accepted will also apply in New Zealand.

Attachments

The following documents form attachments to this report:

Copy of Transport Canada Type Certificate Data Sheet Number E-19

Sign off




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David Gill
Team Leader Airworthiness




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Checked – Colin Winterburn
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>
PW120	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
PW124B, PW127	Aerospatiale Avions (France)	96/21B/2	10 November 1995
PW123	Tasman Pacific Airlines NZ Ltd	0/21B/11	4 March 2000
PW123D	Air National Corporate Ltd	3/21B/32	6 June 2003
PW127E, F, M	ATR – GIE	12/21B/12	7 September 2012
PW120 Series	Pratt & Whitney Canada Corp.	17/21B/27	31 August 2018
PW127XT-L/M/N	Pratt & Whitney Canada Corp.	25/21B/1	27 August 2024