# TYPE-CERTIFICATE DATA SHEET

No. IM.E.096

**for**
PW800 Series Engines

**Type Certificate Holder**
Pratt & Whitney Canada Corp.
1000 Marie-Victorin
Longueuil, Quebec J4G1A1
Canada

For Models:

PW814GA
PW815GA
PW812D

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## I. General

### 1. Type/Model

| Type | Models |
|---|---|
| PW800 | PW814GA |
| | PW815GA |
| | PW812D |

These models are approved for use on multi-engine civil aircraft at the ratings and within the operating limitations specified below, subject to compliance with the aircraft powerplant installation requirements.

### 2. Type Certificate Holder

Pratt & Whitney Canada Corp.
1000 Marie-Victorin Longueuil,
Quebec J4G1A1 Canada

### 3. Manufacturer

Pratt & Whitney Canada Corp.
1000 Marie-Victorin Longueuil,
Quebec J4G1A1 Canada

### 4. Date of Application

| Models | Application Date |
|---|---|
| PW814GA | 8 March 2013 |
| PW815GA | |
| PW812D | 11 February 2019 |

### 5. EASA Type Certification Date

| Models | EASA Certification Date |
|---|---|
| PW814GA | 31 August 2017 |
| PW815GA | |
| PW812D | 05 August 2022 |

## II. Certification Basis

### 1. State of Design Authority Certification Basis

| Models | State of Design Authority Certification Basis *(see also Canadian TC E-39)* |
|---|---|
| PW814GA | AWM Chapter 533 at Change 533-13; and<br>Subchapter B of AWM Chapter 516 – Aircraft Engine Emissions, which refers to ICAO Annex 16, Volume II |
| PW815GA | |
| PW812D | AWM Chapter 533 at Change 533-16; and<br>Subchapter B of AWM Chapter 516 – Aircraft Engine Emissions at Change 516-15; including ICAO annex 16 Volume II – Aircraft Engine Emissions, as amended up to and including Amendment 10 (CAEP/11). |

### 2. Reference Date for determining the applicable airworthiness requirements

| Models | Reference Date for Applicable Airworthiness Requirements |
|---|---|
| PW814GA | 31 March 2012 |
| PW815GA | |
| PW812D | 30 November 2018 |

### 3. EASA Certification Basis

#### 3.1 Airworthiness Standards

| Models | EASA Airworthiness Standards |
|---|---|
| PW814GA | CS-E Amendment 3, dated 23 December 2010 (Decision No. 2010/015/R of the Executive Director of the European Aviation Safety Agency) |
| PW815GA | |
| PW812D | CS-E Amendment 4, dated 12 March 2015. |

#### 3.2 Special Conditions (SC)

None

#### 3.3 Equivalent Safety Findings

CS-E 810 ESF – Compressor and Turbine Blade Failure / Fan Integrally-Bladed Rotor (IBR) Airfoil release.

#### 3.4 Deviations

None

### 3.5 Environmental Protection

| Models | Environmental Protection Requirements |
|---|---|
| PW814GA | CS-34 Amendment 4 as implemented by ED Decision 2021/011/R (applicable 25 July 2021), ICAO Annex 16 Volume II, Amendment 10 applicable 1 January 2021 as implemented into EU legislation 27 April 2021. NOx standard in accordance with ICAO Annex 16 Volume II, Part III, Chapter 2, § 2.3.2 e) (CAEP/8). Maximum nvPM mass concentration levels in compliance with Part III, Chapter 4, paragraph 4.2.2.1. nvPM mass and number emissions in compliance with Part III, Chapter 4, paragraph 4.2.2.2 a) 1) and 4.2.2.2 b) 1) (CAEP/11 In-Production standard ). |
| PW815GA | |
| PW812D | |

## III. Technical Characteristics

### 1. Type Design Definition

| Models | Type Design Definition |
|---|---|
| PW814GA | Configuration of the PW814GA and PW815GA engine is defined by Engine Assembly Drawing 33B1170* |
| PW815GA | |
| PW812D | Configuration of the PW812D engine is defined by Engine Assembly Drawing 33B9100* |

* and subsequent approved revisions

### 2. Description

**PW814GA and PW8145GA**

The PW814GA and PW815GA engine models are high bypass ratio two spool turbofan engines, straddle mounted across two bearings and consisting of an eight-stage axial High-Pressure Compressor (HPC), a straight flow annular low emission combustor and a two-stage High Pressure Turbine (HPT). The low-pressure rotor consists of a fan, two boost stages and an axial five-stage Low Pressure Turbine (LPT) connected by a one-piece shaft. The engine is controlled by an engine mounted dual channel engine control (FADEC). The only difference between the PW814GA and the PW815GA is thrust de-rate by means of software selection.

**PW812D**

The PW812D engine model is a scaled down version of the PW814GA and PW815 GA engine. It's a high bypass ratio two spool turbofan engines, straddle mounted across two bearings and consisting of an eight-stage axial High-Pressure Compressor (HPC), a straight flow annular low emission combustor and a two-stage High Pressure Turbine (HPT). The low-pressure rotor consists of a fan, two boost stages and an axial four-stage Low Pressure Turbine (LPT) connected by a one-piece shaft. The engine is controlled by an engine mounted dual channel engine control (FADEC).

### 3. Equipment

See III. 1. Type Design Definition. See also Note 1.

## 4. Dimensions

| | **Dimensions** (m) | | | |
|---|---|---|---|---|
| **Models** | **Overall Length** (flange to flange) | **Overall Length** (fan spinner face to aft tail cone) | **Nominal Diameter** (fan case) | **Maximum Radial Projection** (at drain mast) |
| PW814GA | 2.685 | 3.313 | 1.255 | 0.990 |
| PW815GA | | | | |
| PW812D | 2608 | 2.874 | 1.109 | 0.930 |

## 5. Dry Weight

| **Models** | **Dry Weight** kg (*lbs*) |
|---|---|
| PW814GA | 1408* kg (*3105 lbs*) |
| PW815GA | |
| PW812D | 1237* (2727 lbs) |

The above dry weight value applies to the basic engine and includes standard equipment.
** This is the weight at time of certification, subject to change ± 2% max*

## 6. Ratings

See Notes 2 and 3.

| | **Sea Level Static Thrust** | | | |
|---|---|---|---|---|
| | **Take-off (5 minutes)** | | **Maximum Continuous** | |
| **Models** | **Thrust** *- see Note 3 -* daN (*lbf*) | **Ambient Limit Temperature** °C (*°F*) | **Thrust** daN (*lbf*) | **Ambient Limit Temperature** °C (*°F*) |
| PW814GA | 6863 (*15,429*) | 33 (*91.4*) | 6296 (*14,155*) | 28 (*82.4*) |
| PW815GA | 7122 (*16,011*) | 33 (*91.4*) | 6925 (*15,568*) | 28 (*82.4*) |
| PW812D | 6161 (*13.850*) | 35 (*95*) | 5778 (*12,989*) | 25 (*77*) |

## 7. Control System

| **Models** | **FADEC Hardware P/N** |
|---|---|
| PW814GA | 33B3787* |
| PW815GA | |
| PW812D | 33B7751* |

* and subsequent released part number extensions

## 8. Fluids (Fuel, Oil, Coolant, Additives)

Fuel: Refer to the Engine Maintenance Manual for the list of approved fuels and fuel additives.
Oil: Refer to the Engine Maintenance Manual for the list of approved oils.

## 9. Aircraft Accessory Drives

Refer to the Installation and Operating Manual Section 11 for additional information on provisions and connections for airframe provided components.

## 10. Maximum Permissible Air Bleed Extraction

Customer ECS/WAI + Nacelle Anti Ice: 24% and 23.5% of core flow P2.8/P3.1 combined for PW814GA/PW815GA and PW812D, respectively.
For detailed information see Installation and Operating Manual, Section 11.2

# IV. Operating Limitations

## 1. Temperature Limits

| | **Maximum Permissible Indicated Turbine Temperature (ITT)** | | |
|---|---|---|---|
| **Models** | **Take-off (5 minutes)** *- see Note 3 -* °C (°*F*) | **Maximum Continuous** °C (°*F*) | **Maximum Starting** °C (°*F*) |
| PW814GA | 965 (*1769*) | 956 (*1753*) | 975 (*1787*) |
| PW815GA | | | |
| PW812D | *985 (1805)* | *920 (1688)* | |

Fuel Temperatures:

Refer to of the Installation and Operating Manual Section 6 for fuel temperature limits.

Oil Temperatures:

Refer to Installation and Operating Manual Section 2 for oil temperature limits.

## 2. Speed Limits

| | Maximum Permissible Speeds | | | |
|---|---|---|---|---|
| | Low Pressure Spool (N1) | | High Pressure Spool (N2) | |
| **Models** | **Take-off (*5 minutes*)** *- see Note 3 -* rpm | **Maximum Continuous** rpm | **Take-off (*5 minutes*)** *- see Note 3 -* rpm | **Maximum Continuous** rpm |
| PW814GA | 6315 | | 24043 | |
| PW815GA | | | | |
| PW812D | 7572 | | 24919 | |

**Note:**
*Power setting, power checks, and control of engine thrust output in all operations are based on Low Rotor Speed (N1).*

## 3. Torque Limits

Not applicable

## 4. Pressure Limits

Fuel Pressures:

Refer to Installation and Operating Manual, Section 6 for fuel pressure limits.

Oil Pressures:

Refer to Installation and Operating Manual, Section 2 for oil pressure limits.

Oil pressure is measured relative to #4 bearing compartment pressure. Temporary interruption associated with negative "g" operation is limited to 7 seconds maximum. Normal oil pressure will be restored rapidly once the negative "g" effect has been eliminated.

## 5. Time Limited Dispatch (TLD)

The PW814GA engines and PW815GA engines, equipped with EEC Part number 33B3787-08 and subsequent part numbers, are approved for Time Limited Dispatch (TLD) capability in accordance with CS-E 1030. The dispatch status is referred in the Airworthiness Limitations Manual (ALM) 33B1391 Engine Systems Faults Time Limited Dispatch.

The PW812D engines, equipped with EEC Part number 33B7751-04 and subsequent part numbers, are approved for Time Limited Dispatch (TLD) capability in accordance with CS-E 1030. The dispatch status is referred in the Airworthiness Limitations Manual (ALM) 33B7516 Engine Systems Faults Time Limited Dispatch.

## 6. ETOPS

The PW800 series engines are not approved for Extended Twin Engine Operations (ETOPS) capability in accordance with CS-E 1040.

## V. Operating and Service Instructions

| Manuals | PW814GA/PW815GA | PW812D |
|---|---|---|
| Engine Installation and Operating Manual | P/N 33B1410* | P/N 33B9460* |
| Control System Interface Control Document (CSICD) | P/N 33B1286* | P/N 33B7438* |

* and subsequent approved amendments or issues

| Instructions for Continued Airworthiness (ICA) | PW814GA/PW815GA | PW812D |
|---|---|---|
| Airworthiness Limitations Manual (ALM)** | P/N 33B1391 | P/N 33B7516 |
| Engine Maintenance Manual | P/N 33B1390 | P/N 33B7515 |
| Engine Shop Manual | P/N 33B1393 | P/N 33B7518 |
| Clean, Inspect and Repair Manual | P/N 33B1401 | P/N 33B1401 |
| Components Maintenance Manuals | As published by P&WC | |
| Service Bulletins (SB) | As published by P&WC | |

** The EASA approved Airworthiness Limitation Section of the Instructions for Continued Airworthiness is the Airworthiness Limitations Manual.

## VI. Notes

**Note 1:** The following are standard equipment as itemized in the engine type design definition.

- Full authority digital engine control system comprising electronic engine control with dedicated power source from a permanent magnetic alternator/generator; integrated fuel pump and associated fuel flow metering, filtering with bypass indication, and flow transmission; bleed valve and variable compressor vane actuation; engine harnesses; and speed, temperature, and pressure sensors.
- Dual igniters and dual channel ignition exciter using airframe supplied power.
- Oil and fuel temperature management comprising fuel-oil heat exchanger, air-oil cooler. PW814GA/PW815GA engines also include an integrated drive generator air-oil cooler.
- Lubrication system comprising oil supply and scavenge pump, variable oil pressure valve; temperature, pressure, and level sensors; oil filtering with bypass indication; and chip detection.
- Air Turbine and Starter
- Vibration sensors

Refer to the Installation and Operating Manual Section 11 for accessory power extraction provisions and additional information on provisions and connections for airframe provided components.

**Note 2:** The engine ratings declared in the TCDS and Installation Manual are based on:

- ICAO standard atmospheric conditions
- Sea level static conditions, ISA ambient temperature
- No customer bleed power extraction.
- Ideal inlet (100% recovery)
- Exhaust nozzle with no leakage and with velocity coefficient equal to 1.0.

**Note 3:** The take-off ratings that are nominally limited to 5 minutes duration may be used for up to 10 minutes for one engine inoperative operations without adverse effects upon engine airworthiness. Such operations are anticipated on an infrequent basis (*as engine failure events during take-off are uncommon*) and no limits or special inspections have been imposed.

**Note 4:** Oil Capacity:

| **PW814GA/PW815GA** | | | |
|---|---|---|---|
| | Litres | Imp. Gallons | U.S. Gallons |
| Total | 9.5 | 2.09 | 2.51 |
| Useable | 3.6 | 0.79 | 0.95 |

| **PW812D** | | | |
|---|---|---|---|
| | Litres | Imp. Gallons | U.S. Gallons |
| Total | 10.6 | 2.33 | 2.80 |
| Useable | 4.6 | 1.01 | 1.22 |

**Note 5:** Refer to Installation and Operating Manual Section 7 for High Intensity Radiated Fields (HIRF) and Lightning qualification and conformance. Refer to Electrical drawing referred to in the Installation and Operating Manual and Control System Interface Control Document (CSICD) for functional and electrical descriptions.

**Note 6:** Engine mount system provisions are specified in Installation Drawing (PW812GA/PW815GA: P/N 33B1172 and PW812D: P/N 33B7509) and Installation and Operating Manual Section 5.

**Note 7:** Requirements and limitations for ground operation in icing conditions are specified in the Installation and Operating Manual.

**Note 8:** The engine bill of material does not include a thrust reverser. Considerations for installation of a thrust reverser are contained in the Installation and Operating Manual.

**Note 9:** The EEC software has been developed and verified in accordance with RTCA/DO-178C respectively ED-12B, Level A, with system Development assurance carried out in accordance with ED79A/ARP4754A.

For PW812D, compliance with ED-202A/DO-326A and ED-204/DO-355 was demonstrated (airworthiness information security).

## SECTION ADMINISTRATIVE

### I. Acronyms and Abbreviations

| | |
|---|---|
| AEO | All Engines Operative |
| CS-E | Certification Specifications for Engines |
| CW | Clockwise |
| EASA | European Union Aviation Safety Agency |
| EBU | Engine Build-up Unit |
| ECS | Environmental Control System |
| FADEC | Full Authority Digital Engine Control |
| HP | High Pressure |
| ICAO | International Civil Aviation Organisation |
| LP | Low Pressure |
| N1 | Rotational Speed of the Low-Pressure Rotor |
| N2 | Rotational Speed of the High-Pressure Rotor |
| OEI | One Engine Inoperative |
| P&WC | Pratt & Whitney Canada |
| PN | Part Number |
| psi | Pounds per square inch |
| psia | Pounds per square ambient |
| psig | Pounds per Square inch gauge |
| rpm | Revolutions per Minute |
| TCCA | Transport Canada Civil Aviation |
| TCDS | Type Certificate Data Sheet |
| W25 | Core Engine Air Mass Flow |
| WAI | Wing Anti-Ice |

### II. Type Certificate Holder Record

Not applicable

## III. Change Record

| Issue | Date | Changes | TC issue |
|---|---|---|---|
| Issue 01 | 31 August 2017 | Initial Issue | 31 August 2017 |
| Issue 02 | 23 August 2019 | Introduction of an ESF to CS-E 810; increase of N1 speed; increase of the max ITT for Max Continuous Thrust and introduction of TLD according to CS-E 1030 (EASA Major Change Approvals 10070794 & 10070796); as well as several administrative corrections | |
| Issue 03 | 11 December 2019 | Introduction of CAEP/10 for nvPM compliance (EASA Major Change approval 10071972) | |
| Issue 04 | 05 August 2022 | Adding PW812D model to TC, minor updates to PW814GA/PW815GA | 05 August 2022 |
| Issue 05 | 17 January 2023 | Introduction of CAEP/11 for nvPM compliance (EASA Major Change approvals 10080808 and 10080811) | 05 August 2022 |
| Issue 06 | 29 June 2023 | Introduction of EEC software 6.3.0.3 according to EASA Major Change approval 10082263 and some corrections. | |

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