



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



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I. General

1. Type/Model

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

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 | 8 March 2013 |

5. EASA Type Certification Date

| Models | EASA Certification Date |
|---------|-------------------------|
| PW814GA | 31 August 2017 |
| PW815GA | |



II. Certification Basis

1. State of Design Authority Certification Basis

| Models | State of Design Authority Certification Basis (<i>see also Canadian TC E-39</i>) |
|---------------|--|
| PW814GA | AWM Chapter 533 at Change 533-13; and Subchapter B of AWM Chapter 516 – Aircraft emissions which refers to ICAO Annex 16, Volume II |
| PW815GA | |

2. Reference Date for determining the applicable airworthiness requirements

| Models | Reference Date for Applicable Airworthiness Requirements |
|---------------|---|
| PW814GA | 31 March 2012 |
| PW815GA | |

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 | |

3.2. Special Conditions (SC)

None

3.3. Equivalent Safety Findings

None

3.4. Deviations

None



3.5. Environmental Protection

| Models | Environmental Protection Requirements |
|---------|--|
| PW814GA | CS-34 Amendment 1, dated 29 January 2013, including: ICAO Annex 16 Volume II, third edition, July 2008, including Amendment 7, effective November 2011, as applicable to turbofan engines. For nitrogen oxides (NO _x) the applicable limits are described in Part III, Chapter 2, paragraph 2.3.2 e) (CAEP/8) |
| PW815GA | |

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 | |

* and subsequent approved revisions

2. Description

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.

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 AGB) |
| PW814GA | 2.687 | 3.315 | 1.270 | 0.988 |
| PW815GA | | | | |

5. Dry Weight

| Models | Dry Weight kg (lbs) |
|---------|------------------------|
| PW814GA | 1423 kg (3136 lbs) |
| PW815GA | |

The above dry weight value applies to the basic engine and includes standard equipment.

6. Ratings

See Notes 2 and 3.

| | Sea Level Static Thrust | | | |
|---------|--|--|------------------------------------|--|
| Models | Take-off (5 minutes) - see Note 3 - daN (lbf) | Flat Rating Ambient Temperature °C (°F) | Maximum Continuous daN (lbf) | Flat Rating Ambient 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) |

7. Control System

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

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

Table below presents the certified power extraction from the engine to operate electrical and hydraulic systems for continuous operation.

| Models | Phase of Flight | Power Extraction per Engine (include electrical and hydraulic demand) Average Options (kW) |
|--------------------|---|---|
| PW814GA PW815GA | Take-off & Go-around (for both All Engine Operating and One Engine Inoperative) | 90.2 |
| | AEO others flight segments | 45.2 |
| | OEI others flight segments | 56.0 |

Overload ground rules assumed in the design of the components are as follows:

1. Accessory Gearbox can sustain 1.5 times the continuous level defined above for 5 minutes
2. Accessory Gearbox can sustain two times the continuous levels defined above for 5 seconds

| Models | Drive (Component) | Rotation | Speed Ratio to N2 | Max Overhung Moment daNm |
|--------------------|----------------------------------|----------|-------------------|--------------------------|
| PW814GA PW815GA | Hydraulic Pump | CW* | 0.1777 | 5.08 |
| | Integrated Drive Generator (IDG) | CW* | 0.3292 | 5.65 |

* Clockwise (*facing the drive pad*)

| Accessory Drives | | | | |
|--------------------|----------------------------------|------------------------------|-------------|---------------|
| Models | Drive (Component) | Torque Nm (<i>lb.-in.</i>) | | |
| | | Continuous | Overload | Static |
| PW814GA PW815GA | Hydraulic Pump | 18.07 (160) | 28.47(252) | 406.74 (3600) |
| | Integrated Drive Generator (IDG) | 20.34 (180) | 33.89 (300) | 412.39 (3650) |

Note: Maximum allowable continuous torque values are at any engine speed unless otherwise specified, provided no destructive forces resulting from accessory torsional vibration are present.

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

10. Maximum Permissible Air Bleed Extraction

Customer ECS/WAI + Nacelle Anti Ice: 24% of core flow P2.8/P3.1 combined.
For detailed information see Installation Manual, Section 11.2



IV. Operating Limitations

1. Temperature Limits

| Models | Maximum Permissible Indicated Turbine Temperature (ITT) | | |
|---------|---|-------------------------------|-----------------------------|
| | Take-off (5 minutes) - see Note 3 - °C (°F) | Maximum Continuous °C (°F) | Maximum Starting °C (°F) |
| PW814GA | 965 (1769) | 950 (1742) | 975 (1787) |
| PW815GA | | | |

Fuel Temperatures:

Refer to Installation and Operating Manual Section 6 for fuel temperature limits. Minimum fuel temperature (less than 0 °C ambient temperature) for ground operation is 8°C (46 °F).

Oil Temperatures:

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

Oil outlet temperature:

Start and Ground Idle:

- Operation between -40°C (-40 °F) and 10°C (50 °F) for Start and Ground Idle only.
- Operation between 146°C (295 °F) and 155°C (310 °F) allowed for 10 minutes at Ground or Flight Idle only.

Minimum oil temperature at idle, before take-off power operation: 10°C (50 °F).

Continuous operation allowed between 10°C (50 °F) and 135°C (275 °F).

Operation between 135°C (275 °F) and 146°C (295 °F) allowed for 10 minutes.

2. Speed Limits

| Models | Maximum Permissible Speeds | | | |
|---------|---|---------------------------|---|---------------------------|
| | Low Pressure Spool (N1) | | High Pressure Spool (N2) | |
| | Take-off (5 minutes) - see Note 3 - rpm | Maximum Continuous rpm | Take-off (5 minutes) - see Note 3 - rpm | Maximum Continuous rpm |
| PW814GA | 6240 | | 24043 | |
| PW815GA | | | | |

Note:

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



| | Minimum Speeds | | | |
|---------|-------------------------|--------------------|--------------------------|--------------------|
| | Low Pressure Spool (N1) | | High Pressure Spool (N2) | |
| Models | Ground Idle rpm | Flight Idle rpm | Ground Idle rpm | Flight Idle rpm |
| PW814GA | 1381 | 1385 | 14200 | |
| PW815GA | | | | |

Note: The minimum N1 certified for in-flight operation in icing conditions is 2018 rpm. The Electronic Engine Control will prevent rotor speeds below this value while in flight.

3. Torque Limits

Not applicable

4. Pressure Limits

Fuel Pressures:

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

- Fuel pressure at the engine fuel pump inlet during operation shall be maintained at not less than 34.5 kPa (5.0 psi) above the true vapor pressure of the fuel but not greater than 965.3 kPa (140 psi) above the absolute ambient pressure with a vapor/liquid ratio of zero.
- The maximum inlet pressure shall not exceed 379.2 kPa (55 psig) for normal operation, the maximum allowable pressure at the fuel pump inlet after shutdown is 1275.5 kPa (185 psig).

Oil Pressures:

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

- Minimum oil pressure at idle is 241.3 kPa (35 psig), variable by N2 speed off idle.
- Maximum oil pressure for continuous operation is 1275.5 kPa (185 psig). Oil pressure between 1275.5 kPa (185 psig) and 1896.1 kPa (275 psig) is limited to 300 seconds.

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 PW800 series engines are not approved for Time Limited Dispatch (TLD) in accordance with CS-E 1030.

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 |
|---|-----------------|
| Engine Installation and Operating Manual | P/N 33B1410 |
| Control System Interface Control Document (CSICD) | P/N 33B1286 |

| Instructions for Continued Airworthiness (ICA) | PW814GA/PW815GA |
|--|----------------------|
| Airworthiness Limitation Manual (AWL)* | P/N 33B1391 |
| Engine Maintenance Manual | P/N 33B1390 |
| Engine Manual | P/N 33B1393 |
| Clean, Inspect and Repair Manual | 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 published in the Chapter 5 of the AWL.

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.
 - FADEC including the accelerometer monitoring for vibration, oil 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, and 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 system temperature management comprising air-to-air heat exchangers, control valves, and sensors.



- Air turbine starter and valve.

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 are based on calibrated test stand performance under the following conditions:

- Sea level static, standard pressure 1.01 bar (14.696 psia), up to the flat rating ambient temperature.
- No customer bleed or customer horsepower extraction.
- Ideal inlet, fan duct and primary nozzle velocity coefficients equal to 1.0, exhaust system with no internal pressure or external scrubbing losses, 100% ram recovery.
- Production aircraft flight cowling.
- Production instrumentation.
- Fuel lower heating value 42798 KJoule/kg (18400 BTU/lb).

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:

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

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 33B1172 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.



SECTION: ADMINISTRATIVE

I. Acronyms and Abbreviations

| | |
|-------|---|
| CS-E | Certification Specifications for Engines |
| EASA | European 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 |
| 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 |

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