# TYPE-CERTIFICATE DATA SHEET

No. IM.E.090

**for**
PW1500G Series Engines

**Type Certificate Holder**
Pratt & Whitney
400 Main Street
East Hartford, CT 06118
United States of America

For Models:

PW1519G
PW1521G
PW1524G
PW1525G

PW1521G-3
PW1524G-3
PW1525G-3

PW1521GA

PW1919G
PW1921G
PW1922G
PW1923G

PW1923G-A

 

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## I. General

### 1. Type/ Model

| Type | Models |
|---|---|
| PW1500G | PW1519G |
| | PW1521G |
| | PW1524G |
| | PW1525G |
| | PW1521G-3 |
| | PW1524G-3 |
| | PW1525G-3 |
| | PW1521GA |
| | PW1919G |
| | PW1921G |
| | PW1922G |
| | PW1923G |
| | PW1923G-A |

### 2. Type Certificate Holder

Pratt & Whitney
400 Main Street
East Hartford, CT 06118
United States of America

### 3. Manufacturer

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

### 4. Date of Application

| Models | Application Date |
|---|---|
| PW1519G | 08 August 2011 |
| PW1521G | 02 February 2010 |
| PW1524G | 02 February 2010 |
| PW1525G | 11 December 2015 |
| PW1521G-3 / PW1524G-3 / PW1525G-3 | 13 July 2016 |
| PW1919G / PW1921G / PW1922G / PW1923G | 09 May 2017 |
| PW1521GA / PW1923G-A | 18 December 2018 |

 

## 5. EASA Type Certification Date

| Models | EASA Certification Date |
|---|---|
| PW1519G / PW1521G / PW1524G / PW1525G | 18 May 2016 |
| PW1521G-3 / PW1524G-3 / PW1525G-3 | 14 September 2016 |
| PW1919G / PW1921G / PW1922G / PW1923G | 27 February 2018 |
| PW1521GA / PW1923G-A | 20 March 2019 |

## II. Certification Basis

### 1. State of Design Authority Certification Basis

| Models | State of Design Authority Certification Basis |
|---|---|
| All Models | See FAA TCDS Number E00090EN |

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

| Models | Reference Date for Applicable Airworthiness Requirements |
|---|---|
| All Models | 8 February 2010 |

### 3. EASA Certification Basis

#### 3.1. Airworthiness Standards

| Models | EASA Airworthiness Standards |
|---|---|
| PW1519G / PW1521G / PW1524G / PW1525G, PW1521G-3 / PW1524G-3 / PW1525G-3 / PW1521GA | CS-E Amendment 3, dated 23 December 2010 (Decision No. 2010/015/R of the Executive Director of the European Aviation Safety Agency) |
| PW1919G / PW1921G / PW1922G / PW1923G / PW1923G-A | - CS-E Amendment 3, dated 23 December 2010 (Decision No. 2010/015/R of the Executive Director of the European Aviation Safety Agency)<br>-For paragraph CS-E 1050 only: CS-E Amendment 4 dated 12 March 2015 (Decision No. 2015/009/R of the Executive Director of the European Aviation Safety Agency). |

#### 3.2. Special Conditions (SC)

None

#### 3.3. Equivalent Safety Findings

| Models | Equivalent Safety Findings |
|---|---|
| All Models | CS-E 790(a)(1) Ingestion of Rain and Hail – Large hailstone ingestion |

#### 3.4. Deviations

None

### 3.5. Environmental Protection

| Models | Environmental Protection Requirements |
|---|---|
| All Models | CS-34 Amendment 3 as implemented by ED Decision 2019/014/R (29th July 2019); ICAO Annex 16 Volume II, Amendment 9 (1st January 2018) as implemented into EU legislation 11/09/2018 ; NOx levels in compliance with Part III, Chapter 2, paragraph 2.3.2 e) (CAEP/8) of the above mentioned Annex. Maximum nvPM mass concentration levels in compliance with Part III, Chapter 4, paragraph 4.2.2 (CAEP/10) of the above mentioned Annex. |

## III. Technical Characteristics

### 1. Type Design Definition

| Models | Type Design Definition |
|---|---|
| PW1519G / PW1521G / PW1524G / PW1525G / PW1521G-3 / PW1524G-3 / PW1525G-3 / PW1521GA | Engine Assembly Number 5310000 |
| PW1919G / PW1921G / PW1922G / PW1923G / PW1923G-A | Engine Assembly Number 5351000 |

* and subsequent approved revisions

### 2. Description

High bypass ratio, axial-airflow, twin spool turbofan engine, is controlled by a Full Authority Digital Engine Control (FADEC). The low pressure spool consists of a three-stage Low Pressure Turbine that drives a three-stage Low Pressure Compressor, and single stage high bypass Fan through the ratio Fan Drive Gear speed reduction System. The High Pressure Compressor has eight axial stages driven by a two-stage cooled High Pressure Turbine.

### 3. Equipment

See III. 1. Type Design Definition.

### 4. Dimensions

| | **Dimensions** (m) | | | |
|---|---|---|---|---|
| **Models** | **Overall Length** (flange to flange) | **Overall Length** (fan spinner face to aft #6 comp. bolt) | **Nominal Diameter** (fan case) | **Maximum Radial Projection** (at drain mast) |
| All Models | 3.045 | 3.184 | 2.006 | 1.160 |

### 5. Dry Weight

| **Models** | **Dry Weight** kg (lbs) |
|---|---|
| All Models | 2177 kg (4800 lbs) |

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

**6. Ratings**

See Notes 1 and 2.

| | **Sea Level Static Thrust** | | | |
|---|---|---|---|---|
| **Models** | **Take-off (5 minutes)** daN (lbf) | **Flat Rating Ambient Temperature** °C (°F) | **Maximum Continuous** daN (lbf) | **Flat Rating Ambient Temperature** °C (°F) |
| PW1519G | 8796 (19775) | 30 (86) | 8312 (18685) | 25 (77) |
| PW1521G / PW1521G-3 / PW1521GA | 9773 (21970) | 30 (86) | 9235 (20760) | 25 (77) |
| PW1524G / PW1524G-3 | 10854 (24400) | 30 (86) | 10253 (23050) | 25 (77) |
| PW1525G / PW1525G-3 | 10854 (24400) | 30 (86) | 10253 (23050) | 25 (77) |

| | **Sea Level Static Thrust** | | | |
|---|---|---|---|---|
| **Models** | **Normal Take-off (5 minutes)** daN (lbf) | **Flat Rating Ambient Temperature** °C (°F) | **Maximum Take-off (5 minutes)** daN (lbf) | **Flat Rating Ambient Temperature** °C (°F) |
| PW1919G | 9279 (20860) | 30 (86) | 10031 (22550) | 30 (86) |
| PW1921G | 10031 (22550) | 30 (86) | 10724 (24110) | 33 (92) |
| PW1922G | 10593 (23815) | 35 (95) | 10593 (23815) | 35 (95) |
| PW1923G / PW1923G-A | 10593 (23815) | PW1923G: 35 (95) PW1923G-A: 30 (86) | 10724 (24110) | 34 (93) |

| | **Sea Level Static Thrust** | |
|---|---|---|
| **Models** | **Maximum Continuous** daN (lbf) | **Flat Rating Ambient Temperature** °C (°F) |
| PW1919G | 9032 (20305) | 25 (77) |
| PW1921G | 9699 (21805) | 25 (77) |
| PW1922G | 9032 (20305) | 25 (77) |
| PW1923G / PW1923G-A | 9699 (21805) | 25 (77) |

| **Models** | **Data Storage Unit (Ratings Plug) PN** |
|---|---|
| PW1519G | 5325208 or 5327258 |
| PW1521G | 5325206 or 5327259 |
| PW1524G | 5325211 or 5327260 |
| PW1525G | 5325209 or 5327257 |
| PW1521G-3 | 5325207 or 5327261 |
| PW1524G-3 | 5325205 or 5327263 |
| PW1525G-3 | 5325212 or 5327262 |
| PW1521GA | 5325781 or 5327264 |
| PW1919G | 5327459 or 5327587 |
| PW1921G | 5322353 or 5327583 |
| PW1922G | 5327453 or 5327578 |
| PW1923G | 5322354 or 5327584 |
| PW1923G-A | 5328019 |

 

**7. Control System**

Full Authority Digital Engine Control (FADEC)

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

Fuel: For models PW1519G, PW1521G, PW1524G, PW1525G, PW1521G-3, PW1524G-3, PW1525G-3 and PW1521GA refer to Service Bulletin PW1000G-A-73-00-0010-00A-930A-D for approved fuels and fuel additives.

For models PW1919G, PW1921G, PW1922G, PW1923G and PW1923G-A refer to Service Bulletin PW1000G- A-73-00-0001-00B-930A-D for approved fuels and fuel additives.

Oil: For models PW1519G, PW1521G, PW1524G, PW1525G, PW1521G-3, PW1524G-3, PW1525G-3 and PW1521GA refer to Service Bulletin PW1000G-A-73-00-0010-00A-930A-D for approved oils.

For models PW1919G, PW1921G, PW1922G, PW1923G and PW1923G-A refer to Service Bulletin PW1000G- A-73-00-0001-00B-930A-D for approved oils.

**9. Aircraft Accessory Drives**

For models PW1519G, PW1521G, PW1524G, PW1525G, PW1521G-3, PW1524G-3, PW1525G-3 and PW1521GA:

| **Drive Pad** | **Rotation** | **Speed Ratio to N2** | **Torque-Continuous** daNm (lb.-in.) | **Torque-Overload** daNm (lb.-in.) | **Torque-Static** daNm (lb.-in.) | **Overhung Moment** daNm (lb.-in.) |
|---|---|---|---|---|---|---|
| Hydraulic Pump | CW | 0.1835:1 | 9.15 (810) | 18.64 (1650) | 40.67 (3600) | 1.97 (175) |
| Integrated Drive Generator (IDG) | CW | 0.8595:1 | 6.32 (560) | 18.30 (1620) | 62.14 (5500) | 10.45 (925) |

CW: Clockwise
*: Maximum allowable continuous torque values are at any engine speed unless otherwise specified, provided no destructive forces resulting from accessory torsional vibration are present.
Maximum allowable continuous overhung bending moments of accessories about drive face are as shown above provided no destructive forces resulting from vibration are present.

For models PW1919G, PW1921G, PW1922G, PW1923G and PW1923G-A:

| **Drive Pad** | **Rotation** | **Speed Ratio to N2** | **Torque-Continuous** daNm (lb.-in.) | **Torque-Overload** daNm (lb.-in.) | **Torque-Static** daNm (lb.-in.) | **Overhung Moment** daNm (lb.-in.) |
|---|---|---|---|---|---|---|
| Hydraulic Pump | CW | 0.1835:1 | 4.74 (420) | 4.52 (400) | 40.67 (3600) | 2.09 (185.5) |
| Integrated Drive Generator (IDG) | CW | 0.8595:1 | 3.16 (280) | 12.65 (1120) | 62.14 (5500) | 10.45 (925) |

CW: Clockwise
Maximum allowable continuous overhung bending moments of accessories about drive face are as shown above provided no destructive forces resulting from vibration are present.

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

**10. Maximum Permissible Air Bleed Extraction**

Maximum permissible bleed air extraction limits are specified in the applicable Installation and Operating Manual (see section V.).

## IV. Operating Limitations (see also Note 7.)

### 1. Temperature Limits

| | **Maximum Permissible Indicated Turbine Temperature (ITT)** | | |
|---|---|---|---|
| **Models** | **Take-off (5 minutes)*, ****<br>*- see Note 2 -*<br>°C (°F) | **Maximum Continuous**<br><br>°C (°F) | **Maximum Starting**<br><br>°C (°F) |
| All models | 1054 (1929) | 1017 (1863) | 1054 (1929) |
| | 1054 (1929) | 1017 (1863) | 1054 (1929) |
| | 1054 (1929) | 1017 (1863) | 1054 (1929) |
| | 1054 (1929) | 1017 (1863) | 1054 (1929) |

*: For models PW1919G, PW1921G, PW1922G, PW1923G and PW1923G-A, the above shown Take-off (5 minutes) ITT limits are applicable to both the normal and the maximum Take-off ratings.
**: All take-off ratings may be extended to 10 minutes for engine out contingency.

Fuel Temperatures:

Refer to the applicable Installation and Operating Manual Section 5 for fuel temperature limits.

Oil Temperatures:

Refer to the applicable 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)**<br>*- see Note 2 -*<br>rpm | **Maximum Continuous**<br><br>rpm | **Take-off (5 minutes)**<br>*- see Note 2 -*<br>rpm | **Maximum Continuous**<br><br>rpm |
| All Models | 10600 | 10600 | 24470 | 24470 |
| | 10600 | 10600 | 24470 | 24470 |
| | 10600 | 10600 | 24470 | 24470 |
| | 10600 | 10600 | 24470 | 24470 |

**Note:**
Power setting, power checks, and control of engine thrust output in all operations are based on Low Rotor Speed (N1). The Fan Speed (NFAN) is directly proportional to N1 by a gear ratio of 1:3.0625.

| | Minimum Speeds | | | |
|---|---|---|---|---|
| | Low Pressure Spool (N1) | | High Pressure Spool (N2) | |
| **Models** | **Ground Idle** rpm | **Flight Idle** rpm | **Ground Idle** rpm | **Flight Idle** rpm |
| All models | 1574 | 1991 | 13264 | 13264 |

**Note:**
For all models, the minimum N1 certified for in-flight operation in icing conditions is 1991 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 the applicable Installation and Operating Manual Section 5 for fuel pressure limits.

Oil Pressures:

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

Oil pressure is measured relative to main lube 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)**

All models are approved for Time Limited Dispatch (TLD) in accordance with CS-E 1030. The dispatch criteria are contained in the applicable Airworthiness Limitation Manual (AWL, see reference in paragraph V.)

**6. ETOPS**

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

## V. Operating and Service Instructions

| Manuals | PW1519G / PW1521G / PW1524G / PW1525G / PW1521G-3 / PW1524G-3 / PW1525G-3 / PW1521GA |
|---|---|
| Engine Installation and Operating Manual | PWA-8828 |

| Instructions for Continued Airworthiness (ICA) | PW1519G / PW1521G / PW1524G / PW1525G / PW1521G-3 / PW1524G-3 / PW1525G-3 / PW1521GA |
|---|---|
| Airworthiness Limitation Manual (AWL)* | P/N 5305816 |
| Engine Maintenance Manual (EMM) | P/N 5305818 |
| Engine Manual (EM) | P/N 5305815 |
| Cleaning, Inspection and Repair Manual (CIR) | P/N 5305817 |
| Fault Isolation Procedures Manual (FIM) | P/N 5319822 |
| Standard Practices Manual (SPM) | P/N 585005 |
| Special Procedures – Fan Drive Gear System (FDGS) Manual | P/N 5317957 |
| Special Procedures – High Pressure Compressor (HPC) Module | P/N 5317961 |
| Special Procedures – High Pressure Turbine (HPT) Module | P/N 5317960 |
| Special Procedures – High Pressure Turbine (HPT) Core | P/N 5324688 |
| Special Procedures – High Pressure Turbine (HPT) Nut | P/N 5324694 |
| Component Maintenance Manuals (CMM) | |

 

| Manuals | PW1919G / PW1921G / PW1922G / PW1923G / PW1923G-A |
|---|---|
| Engine Installation and Operating Manual | PWA-10649 |

| Instructions for Continued Airworthiness (ICA) | PW1519G / PW1521G / PW1524G / PW1525G / PW1521G-3 / PW1524G-3 / PW1525G-3 / PW1923G-A |
|---|---|
| Airworthiness Limitation Manual (AWL)* | P/N 5321709 |
| Engine Maintenance Manual (EMM) | P/N 5321705 |
| Engine Manual (EM) | P/N 5321708 |
| Cleaning, Inspection and Repair Manual (CIR) | P/N 5321706 |
| Fault Isolation Procedures Manual (FIM) | P/N 53224967 |
| Standard Practices Manual (SPM) | P/N 585005 |
| Special Procedures – Fan Drive Gear System (FDGS) Manual | P/N 5321702 |
| Special Procedures – High Pressure Compressor (HPC) Module | P/N 5321703 |
| Special Procedures – High Pressure Turbine (HPT) Module | P/N 5321704 |
| Special Procedures – High Pressure Turbine (HPT) Core | P/N 5324689 |
| Special Procedures – High Pressure Turbine (HPT) Nut | P/N 5324695 |
| Component Maintenance Manuals (CMM) | |

* The EASA approved Airworthiness Limitation Section of the Instructions for Continued Airworthiness is published in the Chapter 5 of the AWL.

## VI. Notes

**1.** 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, 100% ram recovery.
- Production aircraft flight cowling.
- Production instrumentation.
- Fuel lower heating value 42798 KJoule/kg (18400 BTU/lb).

**2.** 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.

**3.** Engine mount provisions for models PW1519G, PW1521G, PW1524G, PW1525G, PW1521G-3, PW1524G-3 and PW1521GA are specified in Installation Drawing 5310001 and Mount and Manoeuver Load Drawing 5310003.

Engine mount provisions for models PW1919G, PW1921G, PW1922G, PW1923G and PW1923G-A are specified in Installation Drawing 5350001 and Mount and Manoeuver Load Drawing 5350003.

**4.** The thrust reverser is not engine of type design and is certified as part of the aircraft. Information for installation of a thrust reverser is contained in the applicable Installation and Operating Manual (see section V.).

**5.** Lightning protection requirements and electromagnetic interference emitted by the electronic engine control system, including cables, are specified in the applicable Installation and Operating Manual (see section V.).

**6.** Requirements and limitations for ground operation in icing conditions are specified in the applicable Installation and Operating Manual (see section V.).

**7.** The engine TC has been transferred from Pratt & Whitney Canada Corp. to Pratt & Whitney on 6 December 2016.

 

## 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
FAA Federal Aviation Administration
FADEC Full Authority Digital Engine Control
HP High Pressure
ICAO International Civil Aviation Organisation
ITT Indicated Turbine Temperature
LP Low Pressure
P&WC Pratt & Whitney Canada
PN Part Number
TC Type Certificate
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 | 18 May 2016 | Initial Issue | 18 May 2016 |
| Issue 02 | 08 June 2016 | Includes approval statement for Time Limited Dispatch (TLD). | As for Issue 01 above |
| Issue 03 | 14 September 2016 | Addition of PW1521G-3, PW1524G-3 and PW1525G-3 models | 14 September 2016 |
| Issue 04 | 06 December 2016 | -Change of Type Certificate Holder from PW Canada to PW<br>-Change reference for fluids (see 8.) | 06 December 2016 |
| Issue 05 | 27 February 2018 | -Addition of models PW1919G, PW1921G, PW1922G and PW1923G<br>-Various editorial changes | 27 February 2018 |
| Issue 06 | 20 March 2019 | -Addition of models PW1521GA and PW1923G-A<br>-Revision of Maximum Continuous ITT limits in paragraph IV.1.<br>-Various editorial changes | 20 March 2019 |
| Issue 07 | 12 December 2019 | Update of emission requirement compliance (certificate 10072019) | 20 March 2019 |

-END-