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

PW1919G
PW1921G
PW1922G
PW1923G

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I. General

1. Type/ Model

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

2. Type Certificate Holder

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

See Note 9.

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

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

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	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	- CS-E Amendment 3, dated 23 December 2010 (Decision No. 2010/015/R of the Executive Director of the European Aviation Safety Agency) -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 2, dated 12 January 2016, including: ICAO Annex 16 Volume II, third edition, July 2008, including Amendment 8, July 2014, as applicable to turbofan engines. For nitrogen oxides (NOx) the applicable limits are described in Part III, Chapter 2, paragraph 2.3.2 e) (CAEP/8)

III. Technical Characteristics

1. Type Design Definition

Models	Type Design Definition
PW1519G / PW1521G / PW1524G / PW1525G / PW1521G-3 / PW1524G-3 / PW1525G-3	Engine Assembly Number 5310000
PW1919G / PW1921G / PW1922G / PW1923G	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)** - *see Note 2* - 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	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)** - *see Note 2* - daN (lbf)	**Flat Rating Ambient Temperature** °C (°F)	**Maximum Take-off (5 minutes)** - *see Note 2* - 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	10593 (23815)	35 (95)	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	9699 (21805)	25 (77)

Models	Data Storage Unit (Ratings Plug) PN
PW1519G	5323246
PW1521G	5323244
PW1524G	5323242
PW1525G	5323240
PW1521G-3	5325207
PW1524G-3	5325205
PW1525G-3	5325212
PW1919G	5322351
PW1921G	5322352
PW1922G	5322353
PW1923G	5322354

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 and PW1525G-3 refer to Service Bulletin PW1000G-A-73-00-0010-00A-930A-D for approved fuels and fuel additives.

For models PW1919G, PW1921G, PW1922G and PW1923G 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 and PW1525G-3 refer to Service Bulletin PW1000G-A-73-00-0010-00A-930A-D for approved oils.

For models PW1919G, PW1921G, PW1922G and PW1923G 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 and PW1525G-3:

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 and PW1923G:

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)*, **** *- see Note 2 -* °C (°F)	**Maximum Continuous** °C (°F)	**Maximum Starting** °C (°F)
All models	1054 (1929)	1006 (1843)	1054 (1929)
	1054 (1929)	1006 (1843)	1054 (1929)
	1054 (1929)	1006 (1843)	1054 (1929)
	1054 (1929)	1006 (1843)	1054 (1929)

*: For models PW1919G, PW1921G, PW1922G and PW1923G, 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)** *- see Note 2 -* rpm	**Maximum Continuous** rpm	**Take-off (5 minutes)** *- see Note 2 -* rpm	**Maximum Continuous** 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
PW1519G / PW1521G / PW1524G / PW1525G / PW1521G-3 / PW1524G-3 / PW1525G-3	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
Engine Installation and Operating Manual	PWA-8828

Instructions for Continued Airworthiness (ICA)	PW1519G / PW1521G / PW1524G / PW1525G / PW1521G-3 / PW1524G-3 / PW1525G-3
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
Engine Installation and Operating Manual	PWA-10649

Instructions for Continued Airworthiness (ICA)	PW1519G / PW1521G / PW1524G / PW1525G / PW1521G-3 / PW1524G-3 / PW1525G-3
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. Regarding components and engine configuration for models PW1519G, PW1521G, PW1524G, PW1525G, PW1521G-3, PW1524G-3 and PW1525G-3 refer to Installation drawing 5310001.

Regarding components and engine configuration for models PW1919G, PW1921G, PW1922G and PW1923G refer to Installation drawing 5350001.

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

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

5. 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.

6. 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.).

7. For models PW1519G, PW1521G, PW1524G, PW1525G, PW1521G-3, PW1524G-3 and PW1525G-3 engine mount system provisions are specified in Installation Drawing 5310001 and Mount and Maneuver Load Drawing, 5310003.

For models PW1919G, PW1921G, PW1922G and PW1923G engine mount system provisions are specified in Installation Drawing 5350001 and Mount and Maneuver Load Drawing, 5350003.

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

9. 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 -Change reference for fluids (see 8.)	06 December 2016
Issue 05	27 February 2018	-Addition of models PW1919G, PW1921G, PW1922G and PW1923G -Various editorial changes	27 February 2018

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