# TYPE-CERTIFICATE DATA SHEET

EASA.IM.E.048

**for**
PW530 Series Engines

**Type Certificate Holder**
Pratt and Whitney Canada Corp.
1000 Marie-Victorin
Longueuil, Quebec
Canada J4G 1A1

For Models:

PW530A
PW535A
PW535B
PW535E
PW535E1

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**TABLE OF CONTENTS**



 

# I. General

## 1. Type/ Model

PW530A, PW535A, PW535B, PW535E, PW535E1

## 2. Type Certificate Holder

Pratt and Whitney Canada Corp.
1000 Marie-Victorin
Longueuil, Quebec
Canada J4G 1A1

## 3. Manufacturer

Pratt and Whitney Canada Inc.

## 4. Date of Application

| PW530A | PW535A | PW535B | PW535E | PW535E1 |
|---|---|---|---|---|
| 11 August 1995 | 11March 1997 | 23 September 2005 | 28 February 2007 | 1 October 2018 |

## 5. Certification Reference Date

| PW530A | PW 535A | PW535B | PW535E | PW535E1 |
|---|---|---|---|---|
| 31 August 1993 | 31 August 1993 | 13 May 2005 | 30 December 2006 | 30 December 2006 |

## 6. EASA Type Certification Date

| PW530A | PW535A | PW535B | PW535E | PW535E1 |
|---|---|---|---|---|
| 15 April 1997 | 6 March 2000 | 14 August 2007 | 28 April 2010 | 10 January 2020 |

EASA Type Certification for the PW530A and PW535A engine models is granted, in accordance with article 2 paragraph 3 (a)(i) of EU Commission Regulation (EC) 1702/2003, based on previous EASA Member State validations granted following the JAA Validation Recommendation.

# II. Certification Basis

## 1. EASA Certification Basis

The EASA Certification Basis for the PW530A and PW535A models is described in the Joint Validation Basis in paragraph 2.1

PW535B

Applicable Certification Specification:
CS-E dated October 24, 2003

PW535E and PW535E1

Applicable Certification Specification
CS-E, Amendment 1 dated 10 December 2007

### 1.1. Airworthiness Standards

PW530A

- JAR-E change 8 dated 4 May 1990 plus Orange Paper E/91/1 dated 27 May 1991 and Orange Paper E/93/1 dated 17 May 1993 and NPA-E-20 for Medium Bird Ingestion.

PW535A

- JAR-E Change 9 dated 21 October 1994 plus Orange Papers E/96/1 dated 8 August 1996 and E/97/1 dated 30 December 1997 and NPA-E-20 for Medium Bird Ingestion.

### 1.2. Special Conditions (SC)

PW530A

- SC1 - Ingestion of Rain
- SC2 – Ingestion of Hail

PW535A

- SC1 - Inclement Weather in accordance with NPA-E-27 dated 16 September 1997

### 1.3. Equivalent Safety Findings (ESF)

PW530A

- JAR-E 840(a)(2) Rotor Integrity tests

 

PW530A and PW535A

- JAR-E 890 Thrust Reverser Tests

### 1.4 Deviations

PW530A and PW535A

- JAR-E 570(a)(3) Oil System - oil pump inlet strainers
- JAR-E 800 Bird Strike/Ingestion - medium birds – Compliance shown with NPA-E-20

### 1.5. Environmental Protection

PW530A and PW535A

- Emissions and Fuel Venting: ICAO Annex 16, Volume II, 2nd Edition, 1993.

PW535B

- ICAO Annex 16, Volume II, Part III, Chapter 2 - Emissions at Amendment 5
- ICAO Annex 16, Volume II, Part II, Chapter 2 - Fuel Venting

PW535E and PW535E1

- ICAO Annex 16, Volume II, Part III, Chapter 2 - Emissions at Amendment 5 (PW535E) and at Amendment 8 (PW535E1)
- ICAO Annex 16, Volume II, Part II, Chapter 2 - Fuel Venting

 

# III. Technical Characteristics

## 1. Type Design Definition

The build standards are defined in the following Parts Lists or later approved issues:

| Models | Type Design Definition |
|---|---|
| PW530A | parts list EAPL A31J1400-01 |
| PW535A | parts list EAPL A3041960-01 |
| PW535B | parts list EAPL A3071463-01 |
| PW535E | parts list EAPL A3072913-01 |
| PW535E1 | parts list EAPL A3135603 |

## 2. Description

Dual Spool, axial flow, medium bypass turbofan. The 2-stage axial and single stage centrifugal high pressure compressor is driven by a single stage high pressure turbine. The integrally bladed fan and single boost stage (for PW535A and PW535B) low pressure compressor is driven by a 2-stage low pressure turbine. Reverse flow annular combustion chamber. The PW530A and PW535A models are controlled by a hydromechanical system the PW535B, PW535E and PW535E1 are controlled by a dual channel FADEC.

## 3. Equipment

Approved Equipment is included in the type design definition.

## 4. Dimensions

| | PW530A | PW535A | PW535B | PW535E/ PW535E1 |
|---|---|---|---|---|
| Overall Length [m] | 1.532 | 1.646 | 1.646 | 1.679 |
| Diameter [m] | 0.814 | 0.953 | 0.953 | 1.082 |

 

## 5. Dry Weight

| Models | Dry Weight* (kg) |
|---|---|
| PW530A | 279.6 |
| PW535A | 317 |
| PW535B | 318.4 |
| PW535E | 317 |
| PW535E1 | 317 |

* excluding all fluids and buyer furnished equipment

## 6. Ratings

| Rating | | PW530A | PW535A | PW535B | PW535E | PW535E1 |
|---|---|---|---|---|---|---|
| Thrust, daN | Take-off (5 minutes) | 1284.2 | 1512.4 | 1512.4 | 1494.6 | 1547,1 |
| | Maximum Continuous | 1264.6 | 1512.4 | 1512.4 | 1494.6 | 1547,1 |

Take off ratings quoted valid up to 22.8ºC (PW530A), 27.2°C (PW535A and PW535B), 33°C (PW535E and PW535E1); maximum continuous ratings to 15ºC (PW530A), 19.6°C (PW535A and PW535B), 24°C (PW535E and PW535E1)

## 7. Control System

Engine control system comprises a hydro-mechanical control (PW530A and PW535A) and a dual channel FADEC for PW535B, PW535E and PW535E1.

## 8. Fluids

### 8.1. Fuel

For approved fuel types and additives refer to relevant Maintenace Manual Chapter 72.

### 8.2. Oil

For approved oil types and additives refer to relevant Maintenance Manual Chapter 72.

## 9. Aircraft Accessory Drives

see Installation Manual

 

**10. Maximum Permissible Air Bleed Extraction**

The maximum permissable bypass air bleed is 3% of the bypass mass flow throughout the flight envelope. For high pressure compressor air bleed information refer to the relevant Installation Manual, Section 2.

# IV. Operating Limitations

**1. Temperature Limits**

**1.1 Interturbine Temperature (IIT), ºC**

| | PW530A | PW535A/PW535B | PW535E/PW535E1 |
|---|---|---|---|
| Maximum Take-off | - | - | 725 |
| Take-off (5 Minutes) | 700 | 700 | 700 |
| Maximum Continuous | 700 | 700 | 680 |
| Starting (5 seconds) | 740 | 740 | 740 |
| Transient (20 seconds maximum) | 740 | 740 | 765 |

**1.2 Fuel temperature**

Min.: -41°C Max.: 99°C at FCU Inlet Refer to relevant Installation Manual Section 6.

**1.4 Oil temperature**

10°C to 132°C Refer to relevant Installation Manual Section 2.

**2. Pressure Limits**

**2.1 Fuel pressure**

Min.: 36,2 kPa above true vapour pressure or 6,9 kPa above ambient pressure at FMU Inlet
Max.: 275,8 kPa (running engine) 586 kPa (engine shut down)
Refer to relevant Installation Manual Section 6.

**2.2 Oil pressure**

Min.: 310 kPa Max.: 1103 kPa Refer to relevant Installation Manual Section 2.

## 3. Maximum / Minimum Permissible Rotor Speeds

PW530A

| | Take Off / Maximum Continuous | Transient (20s) | Minimum Flight Idle |
|---|---|---|---|
| Low Pressure Rotor N1 rpm (%) | 15750 (100) | 16065 (102) | -- |
| High Pressure Rotor N2 rpm (%) | 32150 (100) | 32793 (102) | 15880 (49.4) |

PW535A/PW535B

| | Take Off / Maximum Continuous | Transient (20s) | Minimum Flight Idle |
|---|---|---|---|
| Low Pressure Rotor N1 rpm (%) | 15850 (100) | 16167 (102) | -- |
| High Pressure Rotor N2 rpm (%) | 33970 (100) | 34649 (102) | 17975 (52.9) for PW535A<br>18140 (53.4) for PW535B |

PW535E/PW535E1

| | Take Off / Maximum Continuous | Transient (20s) | Minimum Flight Idle |
|---|---|---|---|
| Low Pressure Rotor N1 rpm (%) | 15850 (100) | 16167 (102) | -- |
| High Pressure Rotor N2 rpm (%) | 34310 (101) | 34989 (103) | 18717 (55.1) |

## 4. Installation Assumptions

The installation assumptions are quoted in the relevant Engine Installation manual.

## 5. Time Limited Dispatch

The PW535E and PW535E1 engines have been approved for Time Limited Dispatch. The maximum rectification period for each dispatchable state is specified in the Maintenance Manual, Airworthiness Limitations Section. See Note 10.

 

## V. Operating and Service Instructions

| | PW530A | PW535A | PW535B | PW535E/PW535E1 |
|---|---|---|---|---|
| Engine Installation Manual | ER3562 | ER3660 | ER6336 | ER6639 |
| Engine Maintenance Manual | 30J1112 | 3044952 | 3071822 | 3072702 |
| Engine Manual (Overhaul) | 30J1113 | 3044953 | 3071823 | 3072703 |
| Service Bulletins | As required | As required | As required | As required |

## VI. Notes

1. The engine ratings are based on dry sea-level static ICAO Standard Atmospheric Conditions, no airbleed and no external accessory loads. The engine ratings specified are obtainable on a test stand with the specified fuel and oil, without intake ducting and using exhaust duct and intake specified in the Installation Manual.

2. Life limited parts are listed in the relevant Maintenance Manual, Airworthiness Limitations Section

3. The software for the PW535B, PW535E and PW535E1 Electronic Engine Control has been developed and tested in accordance with provisions of level A as defined in RTCA DO 178B, with portions of the PW535E1 software as Critical Category, Level A of RTCA DO178C.

4. For the PW535A take off rating may be used for up to 10 minutes during One Engine Inoperative operations without adverse effect upon engine airworthiness. Such operations are anticipated on an infrequent basis (as engine failure at take-off events are uncommon) and no limits or special inspections have been imposed.

5. The engine definition does not include a thrust reverser. Considerations for the installation of a thrust reverser (except the PW535E/PW535E1) are contained in the relevant Installation manual.

6. HIRF and Lightning conformance and installation requirements are provided in the PW535B, PW535E and PW535E1 Installation Manual.

7. PW535B engines incorporating SB PW500-72-30341 are equipped with a FADEC which is approved for Time Limited Dispatch (TLD). The dispatch criteria is defined in the Airworthiness Limitation Section of the Maintenance Manual P/N 3071822. The TLD dispatchable fault configuration is defined in ER 6338-05 Part A – Interface Control Document.
   PW535B engines not incorporating SB PW500-72-30341 are equipped with a FADEC which is not approved for Time Limited Dispatch.

 

8. For PW535B, PW535E and PW535E1 models, Flight Idle is a function of Ambient Pressure.

9. For PW535E and PW535E1, Normal Take-Off is equal to Maximum Take-Off in conditions where wing anti- ice bleed is OFF and may be used for 10 minutes in emergency or OEI conditions. Maximum Take-Off exists for wing anti-ice bleed ON conditions and is for use in emergency, OEI or mono bleed situations.

10. The PW535E and PW535E1 models are equipped with a FADEC which is approved for Time Limited Dispatch (TLD). The dispatch criteria are defined in the Airworthiness Limitations Section of the Maintenance Manual. The TLD dispatchable fault configuration is defined in ER6677-01 Part A (PW535E) and ER10106 (PW535E1) - Control System Interface Control Document.

11. The PW535E and PW535E1 electronic engine control has not been fire tested and therefore must not be installed in a designated fire zone.

 

# SECTION: ADMINISTRATIVE

## I. Acronyms and Abbreviations

CS-E Certification Specifications for Engines
EASA European Union Aviation Safety Agency
ESF Equivalent Safety Finding
FADEC Full Authority Digital Engine Control
ICAO International Civil Aviation Organisation
SC Special Condition
TCDS Type Certificate Data Sheet

## II. Type Certificate Holder Record

Pratt and Whitney Canada Corp.
1000 Marie-Victorin
Longueuil, Quebec
Canada J4G 1A1

## III. Change Record

| Issue | Date | Changes | TC issue |
|---|---|---|---|
| Issue 01 | 14 August 2007 | Initial Issue | 14 August 2007 |
| Issue 02 | 13 November 2008 | Introduction of FADEC with Time Limited Dispatch (EASA Major Change Approval P-EASA.IM.E.C.01048) | |
| Issue 03 | 28 April 2010 | Addition of PW535E engine model | 28 April 2010 |
| Issue 04 | 10 January 2020 | Addition of PW535E1 engine model | 10 January 2020 |

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