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# TYPE-CERTIFICATE DATA SHEET

No. IM.E.093

**for**

PW1100G-JM Series Engines

**Type Certificate Holder**

International Aero Engines (IAE), LLC

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

For Models:

PW1133G-JM  
PW1133GA-JM  
PW1130G-JM  
PW1127G-JM  
PW1127GA-JM  
PW1127G1-JM  
PW1124G-JM  
PW1124G1-JM  
PW1122G-JM  
PW1431G-JM



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## **I. General**

### **1. Type/ Model**

Type: PW1100G-JM  
Models: PW1133G-JM, PW1133GA-JM, PW1130G-JM, PW1127G-JM, PW1127GA-JM,  
PW1127G1-JM, PW1124G-JM, PW1124G1-JM, PW1122G-JM, PW1431G-JM

### **2. Type Certificate Holder**

International Aero Engines, LLC  
400 Main Street  
East Hartford, CT 06118  
United States of America

### **3. Manufacturer**

International Aero Engines AG  
400 Main Street  
East Hartford, CT 06118  
United States of America

### **4. Date of Application**

|  |                   |
|--|-------------------|
| All models except for PW1133GA-JM and PW1127GA-JM: | 17 January 2013   |
| PW1133GA-JM and PW1127GA-JM:                       | 21 September 2015 |
| PW1431G-JM:  | 09 December 2016  |

### **5. EASA Type Certification Date**

|                                   |                 |
|-----------------------------------|-----------------|
| All models except for PW1431G-JM: | 30 October 2015 |
| PW1431G-JM:                       | 10 August 2017  |

## **II. Certification Basis**

### **1. State of Design Authority Certification Basis**

Refer to FAA ETCDS E00087EN Revision 4

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

15 December 2011



### 3. EASA Certification Basis

#### 3.1. Airworthiness Standards

CS-E Amendment 3, dated 23 December 2010 (Decision No. 2010/015/R of the Executive Director of the European Aviation Safety Agency)

#### 3.2. Special Conditions (SC)

None

#### 3.3. Equivalent Safety Findings

CS-E 790(a)(1)      Ingestion of Rain and Hail – Large hailstone ingestion  
CS-E 800(d)        Bird Strike and Ingestion – Medium and small birds ingestion tests

#### 3.4. Deviations

None

#### 3.5. Environmental Protection

All models except for PW1431G-JM:  
ICAO Annex 16 Volume II, third edition including Amendment 7 (CAEP/8 NOx Standard), and Part II, Amendment 7, as applicable to turbofan engines

#### **PW1431G-JM:**

CS-34 Amendment 2 dated 12 January 2016.  
ICAO Annex 16, Volume II, Amendment 8, in accordance with Commission Reg. (EU) No. 2016/4 dated 25 January 2016

### III. Technical Characteristics

#### 1. Type Design Definition

All models except for PW1431G-JM:      Installation Drawing 5320001  
PW1431G-JM:                                      Installation Drawing 5330001

#### 2. Description

High bypass ratio, axial-airflow, dual-spool, turbofan engine 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 a single stage high bypass 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

|  |  |
|--|--|
| Overall Length (flange to flange):               | 3.284 m (129.285 inches) +/-0.001 m (0.051 inches) |
| Overall Length (fan spinner face to aft flange): | 3.401 m (133.898 inches)                           |
| Nominal diameter (fan case):                     | 2.224 m (87.566 inches)                            |
| Maximum radial projection (at drain mast):       | 1.274 m (50.150 inches)                            |

#### 5. Dry Weight

2857.6 kg (6300 lbs)

For all models except for the PW1431G-JM the above dry weight value applies to the basic engine and include the IAE, LLC supplied engine build-up component (EBU1). EBU1 components include: Low Oil Pressure Switch, Core Nacelle Temperature Sensor, Gearbox Breather Tube, Engine Air Turbine Starter, starter attachment hardware and seals to gearbox, duct from starter to Starter Air Valve, Starter Air Valve, electrical harnesses, Mass Fuel Flow Meter, environmental control system Intermediate Pressure Check Valve.

The PW1431G-JM engine weight is defined as the dry weight of the basic engine with standard equipment only.

#### 6. Ratings

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).

| Model  | Sea Level Static Thrust |                       |
|--|-------------------------|-----------------------|
|  | Take-Off (5 min.)       | Maximum Continuous    |
| PW1133G-JM   | 147.28 kN (33110 lbf)   | 145.81 kN (32780 lbf) |
| PW1133GA-JM  | 147.28 kN (33110 lbf)   | 145.81 kN (32780 lbf) |
| PW1130G-JM   | 147.28 kN (33110 lbf)   | 145.81 kN (32780 lbf) |
| PW1127G-JM   | 120.43 kN (27075 lbf)   | 117.18 kN (26345 lbf) |
| PW1127GA-JM  | 120.43 kN (27075 lbf)   | 117.18 kN (26345 lbf) |
| PW1127G1-JM  | 120.43 kN (27075 lbf)   | 117.18 kN (26345 lbf) |
| PW1124G-JM   | 107.82 kN (24240 lbf)   | 106.91 kN (24035 lbf) |
| PW1124G1-JM  | 107.82 kN (24240 lbf)   | 106.91 kN (24035 lbf) |
| PW1122G-JM   | 107.82 kN (24240 lbf)   | 106.91 kN (24035 lbf) |
| PW1431G-JM   | 140.39 kN (31572 lbf)   | 138.19 kN (31068 lbf) |
| -Flat rating ambient temperature Takeoff:<br>30°C/86°F for models PW1133G-JM, PW1133GA-JM, PW1130G-JM and PW1431G-JM<br>47°C/117°F for models PW1127G-JM, PW1127GA-JM and PW1127G1-JM<br>51°C/123°C for models PW1124G-JM, PW1124G1-JM and PW1122G-JM<br>-Flat rating ambient temperature Maximum Continuous: 25°C/77°F for all models |                         |                       |



## 7. Control System

| <i>Model</i> | <i>Data Storage Unit (Ratings Plug) P/N</i> |
|--------------|---|
| PW1133G-JM   | 5322188 or 5325241                          |
| PW1133GA-JM  | 5322195 or 5325243                          |
| PW1130G-JM   | 5322189 or 5325245                          |
| PW1127G-JM   | 5322191 or 5325246                          |
| PW1127GA-JM  | 5322196 or 5325242                          |
| PW1127G1-JM  | 5322190 or 5325249                          |
| PW1124G-JM   | 5322193 or 5325248                          |
| PW1124G1-JM  | 5322192 or 5325247                          |
| PW1122G-JM   | 5322194 or 5325244                          |
| PW1431G-JM   | 5324037                                     |

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

Fuel: Service Bulletin PW1000G-1000-73-00-0002-00A-930A-D defines the fuel requirements and provides a listing of approved fuels and fuel additives.

Oil: Service Bulletin PW1000G-1000-79-00-0002-00A-930A-D provides a listing of approved turbine oils.

## 9. Aircraft Accessory Drives

All models except for the PW1431G-JM:

| <i>Drive</i>  | <i>Rotation</i> | <i>Speed Ratio to N2</i> | <i>Torque Nm (lb.-in.)</i> |                 |               | <i>Overhung Moment Nm(lb.-in.)</i> |
|---|-----------------|--------------------------|----------------------------|-----------------|---------------|------------------------------------|
|   |                 |                          | <i>Continuous</i>          | <i>Overload</i> | <i>Static</i> |                                    |
| Hydraulic Pump  | CCW*            | 0.1768.1                 | 146.9 (1300)               | 203.3 (1800)    | 480.1 (4250)  | 45.1 (400)                         |
| Integrated Drive Generator (IDG)  | CCW*            | 0.3932:1                 | 224.8**<br>(1990)          | 505.6 (4475)    | 1062 (9400)   | 101.6 (900)                        |
| Air Turbine Starter   | CCW*            | 0.407:1                  | -                          | 1208 (10692)    | 1026.3 (9084) | 280 (31.6)                         |
| <p>*: Counterclockwise (facing the drive pad)<br/>                     **: maximum allowable continuous torque values are at any engine speed unless otherwise specified provided no destructive forces resulting from accessory torsional vibration are present.</p> |                 |                          |                            |                 |               |                                    |



PW1431G-JM:

| Drive                                    | Rotation | Speed Ratio to N2 | Torque Nm (lb.-in.) |              |               | Overhung Moment Nm(lb.-in.) |
|--|----------|-------------------|---------------------|--------------|---------------|-----------------------------|
|  |          |                   | Continuous          | Overload     | Static        |                             |
| Hydraulic Pump                           | CCW*     | 0.1763.1          | 146.9 (1300)        | 203.3 (1800) | 480.1 (4250)  | 45.1 (400)                  |
| Variable Frequency Drive Generator (VFG) | CCW*     | 0.9611:1          | 112.9 (1000)**      | 146.9 (1300) | 864.8 (7655)  | 144.0 (1275)                |
| Air Turbine Starter                      | CCW*     | 0.407:1           | -                   | 1208 (10692) | 1026.3 (9084) | 280 (31.6)                  |

\*: Counterclockwise (facing the drive pad)  
 \*\*: maximum allowable continuous torque values are at any engine speed unless otherwise specified provided no destructive forces resulting from accessory torsional vibration are present.

**10. Maximum Permissible Air Bleed Extraction**

Customer ECS/WAI: 18.2% W25  
 Nacelle Anti Ice: 1.2% W25

**IV. Operating Limitations**

**1. Temperature Limits**

Maximum permissible Indicated Turbine Temperatures (ITT), °C(°F):

| Take-Off (5 minutes)* | Maximum Continuous | At start-up |
|-----------------------|--------------------|-------------|
| 1083 (1982)           | 1043 (1909)        | 1083 (1982) |

\*: The normal 5 minute takeoff rating may be extended to 10 minutes for engine out contingency.

Fuel Temperatures:

Refer to Installation and Operating manual, paragraph V refers.

Oil Temperatures:

For continuous operation, engine main oil temperature maximum limit varies with engine power level. The limit decreases from 152°C (305°F) at idle power to 146°C (295°F) at cruise power and to 141°C (285°F) at high power. See Installation and Operating Manual for details, paragraph V refers.





Minimum oil temperature at idle, before takeoff power operation: 51.7°C (125°F)

## 2. Speed Limits

| Low Pressure Rotor (N1) rpm  |                        |                        | High Pressure Rotor (N2) rpm |                        |                        |
|--|------------------------|------------------------|------------------------------|------------------------|------------------------|
| Maximum permissible  | Minimum at Ground Idle | Minimum at Flight Idle | Maximum permissible          | Minimum at Ground Idle | Minimum at Flight Idle |
| 10047  | 1750                   | 1801                   | 22300                        | 12400                  | 12400                  |
| <b>Notes:</b><br>-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.<br>-The minimum N1 certified for in-flight operation in icing conditions is 1801 rpm. The Electronic Engine Control will prevent rotor speeds below this value while in flight. |                        |                        |                              |                        |                        |

## 3. Torque Limits

N/A

## 4. Pressure Limits

### 4.1 Fuel Pressure

Fuel pressure at the engine fuel pump inlet during operation shall be maintained at not less than 34.47 kPa (5 psi) above the vapour true pressure of the fuel but not greater than 689.47 kPa (100 psi) above the absolute ambient pressure with a vapour/liquid ratio of zero. The maximum allowable pressure at the fuel pump inlet after shutdown is 834.2 kPa (121 psig).

### 4.2 Oil Pressure

#### Oil Inlet Pressure Limits:

*Minimum:* 434.3 kPa (63 psig) at idle. Variable by N2 Speed of idle. See Installation and Operating Manual for details, paragraph V refers.

*Maximum:* 1861.5 kPa (270 psig).

Oil pressure is measured relative to main lube pressure. Temporary interruption associated with negative “g” operation is limited to 10 seconds maximum. Normal oil pressure will be restored rapidly once the negative “g” effect has been eliminated.

## 5. Time Limited Dispatch (TLD)

All models except for the PW1431G-JM are approved for TLD in accordance with CS-E 1030. FADEC system faults fall into 4 categories as follows: A) No Dispatch, B) Short Term Dispatch, C) Long Term Dispatch or D) Fix at a Operators Discretion. Details on the short and long term dispatch intervals are provided in the Airworthiness Limitations Manual PN 5316993.

The PW1431G-JM engine model is not approved for TLD.



## 6. ETOPS

When compliant with Pratt & Whitney Service Bulletin PW1000G-C-72-00-0056-00A-930A-D latest approved revision, all models except for the PW1431G-JM are approved for ETOPS capability in accordance with CS-E 1040 Amendment 3 for a Maximum Approved Diversion Time of 180 minutes at MCT thrust plus 15 minutes at hold power. ETOPS does not require any special engine limitation, marking placard or configuration other than as instructed by Pratt & Whitney Service Bulletin PW1000G-C-72-00-0056-00A-930A-D latest approved revision. This approval does not constitute an approval to conduct ETOPS operations.

The PW1431G-JM engine model is not eligible for Extended Operations (ETOPS).

## V. Operating and Service Instructions

|                                    |   |
|------------------------------------|---|
| Engine Maintenance Manual:         | PN 5316994 for all models except for the PW1431G-JM   |
| Engine Manual:                     | PN 5316992 for all models except for the PW1431G-JM   |
| Airworthiness Limitations Manual:  | PN 5316993 for all models except for the PW1431G-JM   |
| Clean, Inspect and Repair Manual:  | PN 5315653 for all models except for the PW1431G-JM   |
| Installation and Operating Manual: | PWA-9851 for all models except for the PW1431G-JM<br>PWA-9914 for the PW1431G-JM engine model |

The Instructions for Continued Airworthiness (ICA) for the PW1431G-JM model are not completed yet and any aircraft with that engine installed is not eligible for airworthiness certification.

## VI. Notes

- Note 1:** For all models except for the PW1431G-JM, engine mount system provisions are specified in Installation Drawing 5320001 and Mount and Maneuver Load Drawing, 5320003. PW1431G-JM engine mount system provisions are specified in Installation Drawing 5330001 and Mount and Maneuver Load Drawing, 5330003.
- Note 2:** Engine design and operating limitations are defined in the Installation and Operating Manual, paragraph V refers.
- Note 3:** Electromagnetic compatibility (EMC) protection requirements and electromagnetic interference (EMI) emitted by the electronic engine control system, including cables, are specified in the Installation and Operating Manual, paragraph V refers.
- Note 4:** Requirements and limitations for ground operation in icing conditions are specified in the Installation and Operating Manual, paragraph V refers.



**Note 5:** For all models except for the PW1431G-JM the EASA approved Airworthiness Limitations Section of the Instructions for Continued Airworthiness is published in the PW1100G-JM Airworthiness Limitation Manual PN 5316993 .

The PW1431G-JM Airworthiness Limitation Manual is not completed yet and any aircraft with that engine installed is not eligible for airworthiness certification.

**Note 6:** For all engine models except for the PW1431G-JM, the UT Aerospace System- Aerostructures Thrust Reverser Unit as specified in the Installation and Operating Manual, PWA-9851, is acceptable for use with the engine. The thrust reverser is not part of the engine type design and is certified as part of the aircraft.

For the PW1431G-JM engine model, the Shorts Brother's Thrust Reverser Unit as specified in the Installation and Operating Manual, PWA-9914, is acceptable for use with the engine. The thrust reverser is not part of the engine type design and is certified as part of the aircraft.

## **SECTION: ADMINISTRATIVE**

### **I. Acronyms and Abbreviations**

|       |   |
|-------|---|
| ETCDS | Engine Type Certificate Data Sheet                  |
| CAEP  | Committee on Aviation Environmental Protection      |
| CS-E  | Certification Specifications Engines                |
| ECS   | Environmental Control System                        |
| ETOPS | Extended Range Operation with Two-Engine Aeroplanes |
| FAA   | Federal Aviation Administration                     |
| FADEC | Full Authority Digital Engine Control               |
| ICAO  | International Civil Aviation Organisation           |
| MCT   | Maximum Continuous                                  |
| PN    | Part Number   |
| 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 | 30 October 2015  | Initial Issue  | 30 October 2015      |
| Issue 02 | 20 November 2015 | <ul style="list-style-type: none"><li>• Include approval statement for Time Limited Dispatch (TLD).</li><li>• Revise minimum oil temperature limit.</li><li>• Include reference to the Installation and Operating Manual with respect to the Thrust Reverser the engine is approved to operate with.</li><li>• Revise FADEC hardware PN.</li></ul> | As for Issue 1 above |
| Issue 03 | 13 June 2017     | <ul style="list-style-type: none"><li>• Include approval statement for ETOPS.</li><li>• Remove FADEC Hardware and Software PN and add data Storage Unit PN.</li></ul>  | As for Issue 1 above |
| Issue 04 | 10 August 2017   | <ul style="list-style-type: none"><li>• Include the PW1431G-JM engine model.</li><li>• Editorial changes.</li></ul>  | 10 August 2017       |

-END-

