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

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TABLE OF CONTENTS

I. General....5
1. Type/ Model....5
2. Type Certificate Holder....5
3. Manufacturer....5
4. Date of Application....5
5. EASA Type Certification Date....5
II. Certification Basis....5
1. State of Design Authority Certification Basis....5
2. Reference Date for determining the applicable airworthiness requirements....5
3. EASA Certification Basis....5
3.1. Airworthiness Standards....6
3.2. Special Conditions (SC)....6
3.3. Equivalent Safety Findings....6
3.4. Deviations....6
3.5. Environmental Protection....6
III. Technical Characteristics....6
1. Type Design Definition....6
2. Description....6
4. Dimensions....6
5. Dry Weight....7
6. Ratings....7
7. Control System....7
8. Fluids (Fuel, Oil, Coolant, Additives)....8
9. Aircraft Accessory Drives....8
10. Maximum Permissible Air Bleed Extraction....8
IV. Operating Limitations....8
1. Temperature Limits (see Note 2.)....8
2. Speed Limits....9
3. Torque Limits....9
4. Pressure Limits....9
- **4.1 Fuel Pressure....9**
- **4.2 Oil Pressure....9**

5. Time Limited Dispatch (TLD)....10
6. ETOPS....10
V. Operating and Service Instructions....10
VI. Notes....10
SECTION: ADMINISTRATIVE....10
I. Acronyms and Abbreviations....10
II. Type Certificate Holder Record....11
III. Change Record....11

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 and PW1122G-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 PW1133GA-JM and PW1127GA-JM: 17 January 2013
PW1133GA-JM and PW1127GA-JM: 21 September 2015

5. EASA Type Certification Date

30 October 2015

II. Certification Basis

1. State of Design Authority Certification Basis

Refer to FAA ETCDS E00087EN Revision 1

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

ICAO Annex 16 Volume II, third edition including Amendment 7 (CAEP/8 NOx Standard), and Part II, Amendment 7, as applicable to turbofan engines

III. Technical Characteristics

1. Type Design Definition

Installation Drawing 5320001

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)

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.

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.) (Flat Rating Ambient Temperature: 30°C / 86° F)	*Maximum Continuous (Flat Rating Ambient Temperature: 25°C / 77° F)*
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)

7. Control System

Model	*FADEC Hardware P/N*	*FADEC Software P/N*	*Data Storage Unit (Ratings Plug) P/N*
PW1133G-JM	5323745*	5321231*	5322188*
PW1133GA-JM	5323745*	5321231*	5322195*
PW1130G-JM	5323745*	5321231*	5322189*
PW1127G-JM	5323745*	5321231*	5322191*
PW1127GA-JM	5323745*	5321231*	5322196*
PW1127G1-JM	5323745*	5321231*	5322190*
PW1124G-JM	5323745*	5321231*	5322193*
PW1124G1-JM	5323745*	5321231*	5322192*
PW1122G-JM	5323745*	5321231*	5322194*
*: Or later approved standards			

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

Drive	***Rotation***	***Speed Ratio to N2***	***Torque Nm (lb.-in.)***			***Overhung Moment Nm(lb.-in.)***
			Continuous	***Overload***	***Static***	
Hydraulic Pump	CCW*	0.1768.1	146.9 (1300)	203.3 (1800)	480.1 (4250)	45.1 (400)
Intgrated Drive Generator (IDG)	CCW*	0.3932:1	224.8** (1990)	505.6 (4475)	1062 (9400)	101.6 (900)
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 unlee otherwise specified provided no destructive forces resulting from accesory 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, PWA-9851

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, PWA-9851 for details.

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
Notes: -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. -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, PWA-9851.

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)

The engine is 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 schedule agreed upon between the engine and airframe manufacturer. Details on the short and long term dispatch intervals are provided in the Airworthiness Limitations Manual PN 5316993.

6. ETOPS

The PW1100G-JM series engines are not approved for Extended Twin Engine Operations (ETOPS).

V. Operating and Service Instructions

Engine Maintenance Manual:	PN 5316994
Engine Manual:	PN 5316992
Airworthiness Limitations Manual:	PN 5316993
Installation and Operating Manual:	PWA-9851
Clean, Inspect and Repair Manual:	PN 5315653

VI. Notes

Note 1: Engine mount system provisions are specified in Installation Drawing 5320001 and Mount and Maneuver Load Drawing, 5320003.

Note 2: Engine design and operating limitations are defined in the Installation and Operating Manual, PWA-9851.

Note 3: Lightning protection requirements and electromagnetic interference emitted by the electronic engine control system, including cables, are specified in the Installation and Operating Manual, PWA-9851.

Note 4: Requirements and limitations for ground operation in icing conditions are specified in the Installation and Operating Manual, PWA-9851.

Note 5: The EASA approved Airworthiness Limitations Section of the Instructions for Continued Airworthiness is published in the PW1100G-JM Airworthiness Limitation Manual PN 5316993 .

Note 6: 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.

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

FAA Federal Aviation Administration
FADEC Full Authority Digital Engine Control
ICAO International Civil Aviation Organisation
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	• Include approval statement for Time Limited Dispatch (TLD). • Revise minimum oil temperature limit. • Include reference to the Installation and Operating Manual with respect to the Thrust Reverser the engine is approved to operate with. • Revise FADEC hardware PN.	As for Issue 1 above

[insert rows as needed]

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