

U. S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION TYPE CERTIFICATE DATA SHEET E00087EN	International Aero Engines, LLC MODELS: PW1133G-JM, PW1133GA-JM, PW1130G-JM, PW1129G-JM, PW1127G-JM, PW1127GA-JM, PW1127G1-JM, PW1124G-JM, PW1124G1-JM, PW1122G-JM, PW1431G-JM, PW1431GA-JM, PW1431GH-JM, PW1428G-JM, PW1428GA-JM, PW1428GH-JM Date: May 6, 2019
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Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E00087EN) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations, provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

TYPE CERTIFICATE (TC) HOLDER: International Aero Engines, LLC
 400 Main Street
 East Hartford, CT 06118

TYPE	High bypass ratio, axial-airflow, dual-spool, turbofan engine controlled by a Full Authority Digital Electronic Control (FADEC). The low pressure spool consists of a three-stage low pressure turbine that directly drives a three-stage low pressure compressor, and a single stage high bypass ratio fan through a fan drive gear speed reduction system. The high pressure compressor has eight axial stages driven by a two-stage cooled high pressure turbine.
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MODELS:	PW1133G-JM PW1133GA-JM PW1130G-JM	PW1431G-JM PW1431GA-JM PW1431GH-JM	PW1428G-JM PW1428GA-JM PW1428GH-JM	PW1129G-JM
RATINGS (See NOTE 1)				
SEA LEVEL STATIC THRUST (lb.)				
Takeoff (5 minutes) (See NOTE 2)	33,110	31,572	29,761	29,245
Maximum Continuous	32,780	31,068	28,450	26,345
FLAT RATING AMBIENT TEMPERATURE Takeoff	30°C / 86°F	30°C / 86°F	30°C / 86°F	44°C / 111°F
Maximum Continuous	25°C / 77°F	25°C / 77°F	30°C / 86°F	25°C / 77°F
Data Storage Unit PN (Ratings Plug)	5322188 or 5325241 (PW1133G) 5322195 or 5325243 (PW1133GA) 5322189 or 5325245 (PW1130G)	5324037 or 5327191 (PW1431G) 5313531 (PW1431GA-JM) 5327152 (PW1431GH-JM)	5313532 (PW1428G-JM) 5327153 (PW1428GA-JM) 5327151 (PW1428GH-JM)	5325964 (PW1129G-JM)

LEGEND: "-" INDICATES "SAME AS PRECEDING MODEL" "-" NOT APPLICABLE
 NOTE: SIGNIFICANT CHANGES ARE BLACK-LINED IN THE LEFT MARGIN

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MODELS:	PW1127G-JM, PW1127GA-JM, PW1127G1-JM	PW1124G-JM, PW1124G1-JM, PW1122G-JM		
RATINGS (See NOTE 1)				
SEA LEVEL STATIC THRUST (lb.)				
Takeoff (5 minutes) (See NOTE 2)	27,075	24,240		
Maximum Continuous	26,345	24,035		
FLAT RATING AMBIENT TEMPERATURE				
Takeoff	47°C / 117°F	51°C / 123°F		
Maximum Continuous	25°C / 77°F	25°C / 77°F		
Data Storage Unit PN (Ratings Plug)	5322191 or 5325246 (PW1127G) 5322196 or 5325242 (PW1127GA) 5322190 or 5325249 (PW1127G1)	5322193 or 5325248 (PW1124G) 5322192 or 5325247 (PW1124G1) 5322194 or 5325244 (PW1122G)		

COMPONENTS/CONFIGURATION	For information regarding components and engine configuration, refer to: PW1100G-JM Installation Drawing 5320001 PW1400G-JM Installation Drawing 5330001
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MODELS: (cont.)	PW1133G-JM PW1133GA-JM PW1130G-JM	PW1431G-JM PW1431GA-JM PW1431GH-JM	PW1428G-JM PW1428GA-JM PW1428GH-JM	PW1129G-JM
PRINCIPAL DIMENSIONS (Room temperature)				
Length (flange to flange, in.)	129.285 in +/- 0.051	---	---	---
Length (fan spinner face to aft flange, in.)	133.898 in	---	---	---
Nominal diameter (fan case, in.)	87.566 in	---	---	---
Maximum radial projection (in.) (at drain mast)	50.150 in	---	---	---
CENTER OF GRAVITY (in.)				
Axial engine station, relative to A-flange:	63.510 in	---	---	---
Vertical, relative to engine centerline:	- 1.420 in	---	---	---
Lateral, relative to centerline:	0.820 in	---	---	---
WEIGHT * (DRY) Basic engine (lbs.)	6,300	6,300	6,300	6,300
	*The PW1100G-JM engine weight is defined as the dry weight of the basic engine with IAE, LLC supplied engine build-up component (EBU1). EBU1 components include: Low Oil Pressure Switch; Core Nacelle Temperature Sensor; GBX 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 PW1400G-JM engine weight is defined as the dry weight of the basic engine with standard equipment only			
FUEL	Service Bulletin PW1000G-D-73-00-0002-00A-930A-D defines the fuels requirements and provides a listing of approved fuels and fuel additives for use in the PW1100G-JM and PW1400G-JM series turbofan engines.			
LUBRICATING OILS	Service Bulletin PW1000G-D-79-00-0002-00A-930A-D provides a listing of approved turbine oils for use in the PW1100G-JM and PW1400G-JM series turbofan engines.			

MODELS: (cont.)	PW1127G-JM PW1127GA-JM PW1127G1-JM	PW1124G-JM PW1124G1-JM PW1122G-JM		
PRINCIPAL DIMENSIONS (Room temperature) Length (flange to flange, in.) Length (fan spinner face to aft flange, in.) Nominal diameter (fan case, in.) Maximum radial projection (in.) (at drain mast) CENTER OF GRAVITY (in.) Axial engine station, relative to A-flange: Vertical, relative to engine centerline: Lateral, relative to centerline:	129.285 in +/- 0.051 133.898 in 87.566 in 50.150 in 63.510 in - 1.420 in 0.820 in	-- -- -- -- -- -- -- -- -- -- -- -- -- --		
WEIGHT * (DRY) Basic engine (lbs.)	6,300	6,300		
	*The PW1100G-JM engine weight is defined as the dry weight of the basic engine with IAE, LLC supplied engine build-up component (EBU1). EBU1 components include: Low Oil Pressure Switch; Core Nacelle Temperature Sensor; GBX 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 PW1400G-JM engine weight is defined as the dry weight of the basic engine with standard equipment only			
FUEL	Service Bulletin PW1000G-D-73-00-0002-00A-930A-D defines the fuels requirements and provides a listing of approved fuels and fuel additives for use in the PW1100G-JM and PW1400G-JM series turbofan engines.			
LUBRICATING OILS	Service Bulletin PW1000G-D-79-00-0002-00A-930A-D provides a listing of approved turbine oils for use in the PW1100G-JM and PW1400G-JM series turbofan engines.			
CERTIFICATION BASIS	<p>14 CFR, Part 33, effective February 1, 1965, as amended by 33-1 through 33-32 with the following Equivalent level of safety findings:</p> <ul style="list-style-type: none"> • 33.76, Bird Ingestion, par. (c)(7)(i) ELOS No. TC3289EN-E-P-8-R1 • 33.77, Foreign Object Ingestion-Ice, par. (c) ELOS No. TC3289EN-E-P-5-R1 • 33.78, Rain and Hail Ingestion par. (a)(1) ELOS No. TC3289EN-E-P-6-R1 • 33.27, Rotor Overspeed par (c) & (e) ELOS No TC3289EN-E-P-9* <p>14 CFR, Part 34, Amendment 34-5A, effective October 23, 2013. See NOTE 23 for detailed summary of the certification basis for fuel venting and exhaust emissions.</p> <p>* Applies to all engines configured with EEC Software FCS5.0 standard or greater</p>			

TYPE CERTIFICATE NUMBER E00087EN	
<u>MODEL</u>	<u>APPLICATION</u> <u>ISSUED/AMENDED</u> <u>DELETED</u>
PW1133G-JM	December 15, 2011 December 19, 2014
PW1133GA-JM	June 12, 2015 October 23, 2015
PW1130G-JM	December 15, 2011 October 23, 2015
PW1127G-JM	December 15, 2011 October 23, 2015
PW1127GA-JM	June 12, 2015 October 23, 2015
PW1127G1-JM	December 15, 2011 October 23, 2015
PW1124G-JM	December 15, 2011 October 23, 2015
PW1124G1-JM	December 15, 2011 October 23, 2015
PW1122G-JM	December 15, 2011 October 23, 2015
PW1431G-JM	January 20, 2015 May 6, 2016
PW1129G-JM	April 11, 2017 May 29, 2018
PW1431GA-JM	October 3, 2017 May 29, 2018
PW1431GH-JM	October 3, 2017 May 29, 2018
PW1428G-JM	October 3, 2017 May 29, 2018
PW1428GA-JM	October 3, 2017 May 29, 2018
PW1428GH-JM	October 3, 2017 May 29, 2018
PRODUCTION BASIS (ALL MODELS)	Production Certificate No. 114

NOTES

NOTE 1.**ENGINE RATINGS**

Engine ratings are based on calibrated test stand performance under the following conditions:

1. Sea level static, standard pressure (14.696 psia), up to the flat rating ambient temperature °F
2. No customer bleed or customer horsepower extraction
3. Ideal inlet, 100% ram recovery
4. Production aircraft flight cowlings
5. Production instrumentation
6. Fuel lower heating value of 18,400 BTU/lb.

NOTE 2.**TEMPERATURES**

Maximum permissible Indicated Turbine Temperatures (ITT) are as follows:

Takeoff (5 minutes)*	1,083 degC / 1,982 degF
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Maximum Continuous	1,043 degC / 1,909 degF
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*The normal 5 minute takeoff rating may be extended to 10 minutes for engine out contingency.

Indicated Turbine Temperatures (ITT) at start-up	1,083 degC / 1,982 degF
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Oil outlet temperature:

Continuous operation: Engine main oil temperature maximum limit varies with engine power level. The limit decreases from 152 degC /305 degF at idle power; to 146 degC /295 degF at cruise power; to 141 degC /285 deg F at high power. See PW1100G-JM Installation and Operating Manual, PWA-9851 or PW1400G-JM Installation and Operating Manual, PWA-9914 for details.

Minimum oil temperature at idle, before takeoff power operation: 51.7 degC / 125 degF

Fuel Temperatures:	See PW1100G-JM Installation and Operating Manual, PWA-9851 or PW1400G-JM Installation and Operating Manual, PWA-9914 for details
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Component Temperatures:	See PW1100G-JM Installation and Operating Manual, PWA-9851 or PW1400G-JM Installation and Operating Manual, PWA-9914 for details
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NOTE 3.**PRESSURES**

Fuel pressure limits: Fuel pressure at the engine fuel pump inlet during operation shall be maintained at not less than 5.0 psi above the true vapor pressure of the fuel but not greater than 60 psig with a vapor/liquid ratio of zero. The maximum allowable pressure at the fuel pump inlet after shutdown is 151 psig.

Oil pressure limits:

Minimum: 63 psig at idle. Variable by N2 Speed off idle. See Installation and Operating Manual, PWA-9851 or PW1400G JM Installation and Operating Manual, PWA-9914 for details.

Maximum: 270 psig

Oil supply 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.

NOTE 4. ACCESSORY DRIVE PROVISIONS

PW1100G-JM ACCESSORY DRIVES						
Drive Pad	Rotation	Speed Ratio to N2	Torque (lb.-in.)			Overhung Moment (lb.-in.)
			Continuous	Overload	Static	
Hydraulic Pump	CCW	0.1768 : 1	1300	1800	4250	400
Integrated Drive Generator (IDG)	CCW	0.3932 : 1	1990*	4475*	9400	900
Air Turbine Starter	CCW	0.407 : 1	---	10692	9084	280

CCW = 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.

PW1400G-JM ACCESSORY DRIVES						
Drive Pad	Rotation	Speed Ratio to N2	Torque (lb.-in.)			Overhung Moment (lb.-in.)
			Continuous	Overload	Static	
Hydraulic Pump	CCW	0.1763 : 1	1300	1800	4250	400
Variable Frequency Generator (VFG)	CCW	0.9611 : 1	1000*	1300*	7655	1275
Air Turbine Starter	CCW	0.407 : 1	---	10692	9084	280

CCW = 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.

NOTE 5.**MODEL DESCRIPTION:**

The PW1100G-JM engine series consist of the following engine models:

PW1133G-JM	Basic Model, Airbus A321-271n
PW1133GA-JM	Alternate Climb Thrust Model, Airbus A321-271n
PW1130G-JM	Reduced Thrust Model, Airbus A321-272n
PW1129G-JM	High and Hot Airfield Thrust Model, Airbus A320-271n
PW1127G-JM	Basic Model, Airbus A320-271n
PW1127GA-JM	Alternate Climb Thrust Model, Airbus A320-271n
PW1124G1-JM	Alternate Climb Thrust Model, Airbus A320-272n
PW1127G1-JM	Hot and High Thrust Model, Airbus A319-173n
PW1124G-JM	Basic Model, Airbus A319-171n
PW1122G-JM	Reduced Thrust Model, Airbus A319-172n

The PW1400G-JM engine series consist of the following engine model:

PW1431G-JM	Basic Model, Irkut MC21-300
PW1431GA-JM	Alternate Climb Thrust Model, Irkut MC21-300
PW1431GH-JM	High and Hot Airfield Thrust Model, Irkut MC21-300
PW1428G-JM	Basic Model, Irkut MC21-200
PW1428GA-JM	Alternate Climb Thrust Model, Irkut MC21-200
PW1428GH-JM	High and Hot Airfield Thrust Model, Irkut MC21-200

NOTE 6.**TYPICAL AIRCRAFT ACCESSORIES, COMPONENTS, OR SYSTEM ASSEMBLIES, WITH AIRCRAFT LEVEL REQUIREMENTS, PROVIDED AS PART OF ENGINE TYPE DESIGN:**

For the PW1100G-JM Engine Models: Air Turbine Starter; Starter Air Valve.

NOTE 7.**AIRCRAFT ACCESSORIES, COMPONENTS, OR SYSTEM ASSEMBLIES INSTALLED ON THE ENGINE BUT ARE NOT PROVIDED AS PART OF ENGINE TYPE DESIGN:**

For the PW1400G-JM Engine Models: Low Oil Pressure Switch; Core Nacelle Temperature Sensor; GBX Breather Tube; starter attachment hardware and seals to gearbox; duct from starter to Starter Air Valve; Mass Fuel Flow Meter; environmental control system Intermediate Pressure Check Valve

- NOTE 8.** SPECIAL ANTI-ICING OR DE-ICING REQUIREMENTS:
Not Applicable
- NOTE 9.** ENGINE MOUNT SYSTEM PROVISIONS:
PW1100G-JM Engine mount system provisions are specified in Installation Drawing 5320001 and Mount and Maneuver Load Drawing, 5320003.
PW1400G-JM Engine mount system provisions are specified in Installation Drawing 5330001 and Mount and Maneuver Load Drawing, 5330003.
- NOTE 10.** POWER BOOST, INJECTION OR AUGMENTATION SYSTEMS: Not Applicable
- NOTE 11.** SPECIAL INSTALLATION REQUIREMENTS:
- 1) PW1100G-JM Engine design and operating limitations are defined in the Installation and Operating Manual, PWA-9851.
 - 2) PW1400G-JM Engine design and operating limitations are defined in the Installation and Operating Manual, PWA-9914
 - 3) The PW1133G-JM, PW1133GA-JM, PW1130G-JM, PW1129G-JM, PW1127G-JM, PW1127GA-JM, PW1127G1-JM, PW1124G-JM, PW1124G1-JM, and PW1122G-JM engine models* have complied with the requirements of §§ 33.4 (A33.3(c)), 33.71(c)(4) and 33.201, and are therefore eligible for installation on Extended Operations (ETOPS) and Early ETOPS approved airplanes. The demonstrated diversion time is 180 minutes at MCT plus 15 minutes at hold power. Note that ETOPS eligibility does not constitute airplane or operational level approvals necessary to conduct ETOPS flights.
*Note for the individual engine serial number to be eligible for ETOPS it must comply with Service Bulletin PW1100G-C-72-00-0056-00A-930A-D.
 - 4) The PW1400G-JM Engine Series are not eligible for Extended Operations (ETOPS).
 - 5) The minimum N1 certified for in-flight operation in icing conditions is 1,801 rpm. The Electronic Engine Control will prevent rotor speeds below this value while in flight.
 - 6) The PW1100G-JM engine is certified with Time Limited Dispatch. Criteria pertaining to the engine control systems' dispatch and maintenance requirements for PW1100G-JM engine models installed on the Airbus A320 Aircraft are specified in the PW1100G-JM Airworthiness Limitations Manual PN 5316993 and PWA-10958-01 "PW1100G-JM Turbofan Engine Electronic Engine Control System Fault Message and Dispatch Category Cross-Reference"
 - 7) The PW1400G-JM has no approved criteria pertaining to the engine control systems' time limited dispatch and maintenance requirements
 - 8) The PW1100G-JM 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, PWA-9851.
 - 9) The PW1400G-JM 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, PWA-9914.
 - 10) For the PW1100G-JM, the UT Aerospace System- Aerostructures Thrust Reverser Unit as specified in the Installation and Operating Manual, PWA-9851, is acceptable for use on the engine. The thrust reverser is not part of the engine type design and is certified as part of the aircraft.
 - 11) For the PW1400G-JM, the Shorts Brother's Thrust Reverser Unit as specified in the Installation and Operating Manual, PWA-9914, is acceptable for use on the engine. The thrust reverser is not part of the engine type design and is certified as part of the aircraft.
- NOTE 12.** MANUFACTURER'S SERVICE BULLETINS OR OTHER INSTRUCTIONS COVERING MATTERS OF INTEREST: Not Applicable
- NOTE 13.** SPECIAL OPERATING PROCEDURES:
Requirements and limitations for ground operation in icing conditions are specified in the PW1100G-JM Installation and Operating Manual, PWA-9851 and the PW1400G-JM Installation and Operating Manual, PWA-9914.
- NOTE 14.** SPECIAL REPAIR OR OVERHAUL LIMITATIONS: Not Applicable
- NOTE 15.** APPLICABLE INSTALLATION, MAINTENANCE & OVERHAUL MANUALS
- 1) PW1100G-JM Installation and Operating Manual, PWA-9851
 - 2) PW1400G-JM Installation and Operating Manual, PWA-9914
 - 3) The following PW1100G-JM Engine Instructions for Continued Airworthiness (ICA's) have been accepted by the FAA Engine Certification Office:
 - a. PW1100G-JM Airworthiness Limitations Manual PN 5316993
 - b. PW1100G-JM Engine Maintenance Manual PN 5316994,
 - c. PW1100G-JM Engine Manual PN 5316992,
 - d. PW1100G-JM Clean, Inspect and Repair Manual PN 5315653,
 - e. PW1100G-JM Series Troubleshooting Manual PN 5323704
 - f. Standard Practices Manual PN 585005
 - 4) The PW1400G-JM engine ICA's are incomplete. The aircraft must not be issued a standard airworthiness certificate or approved for return to service until the ICA are complete and determined acceptable.

- NOTE 16.** IMPORT REQUIREMENTS: Not Applicable
- NOTE 17.** LIFE LIMITED PART INFORMATION
- 1) PW1100G-JM Life limits for critical components and mandatory inspection requirements are specified in the PW1100G-JM Airworthiness Limitation Manual PN 5316993 .
 - 2) PW1400G-JM Life limits for critical components and mandatory inspection requirements are specified in report PWA-9913.
- NOTE 18.** MILITARY MODEL INFORMATION Not Applicable
- NOTE 19.** ROTOR SPEEDS
- Maximum permissible Low Pressure Rotor (N1): 10,047 rpm
- Minimum Low Pressure Rotor (N1),
- | | |
|--------------|-----------|
| Ground Idle: | 1,750 rpm |
| Flight Idle: | 1,801 rpm |
- (See Note 11)
- Maximum permissible High Pressure Rotor (N2): 22,300 rpm
- Minimum High Pressure Rotor (N2),
- | | |
|--------------|------------|
| Ground Idle: | 12,400 rpm |
| Flight Idle: | 12,400 rpm |
- Power setting, power checks, and control of engine thrust output in all operations are based on Low Rotor Speed (N1). Fan Speed, (NFAN) is directly proportional to Low Rotor Speed (N1) by a gear ratio of 1: 3.0625.
- NOTE 20.** OUTPUT/PROPELLER SHAFT TORQUE LIMITS: Not Applicable.
- NOTE 21.** BLEED AIR EXTRACTION PROVISIONS:
- Maximum Permissible Bleed Air Extraction
Customer ECS/WAI: 18.2% W25
Nacelle Anti-Ice: 1.2%W25
- NOTE 22.** ROTOR DISK INTEGRITY AND ROTOR BLADE CONTAINMENT (where special requirements apply):
Not Applicable.
- NOTE 23.** EXHAUST EMISSIONS AND FUEL VENTING
- The following emissions standards promulgated in 14 CFR Part 34, Amendment 5A, effective October 23, 2013, and 40 CFR Part 87, effective October 31, 2012, have been complied with for the PW1133G-JM, PW1133GA-JM, PW1130G-JM, PW1129G-JM, PW1127G-JM, PW1127GA-JM, PW1127G1-JM, PW1124G-JM, PW1124G1-JM, PW1122G-JM, PW1431G-JM, PW1431GA-JM, PW1431GH-JM, PW1428G-JM, PW1428GA-JM, PW1428GH-JM engine models:
- Fuel Venting Emission Standards: 14 CFR 34.10(a) and 34.11 ; in addition, 40 CFR 87.10(a) and 87.11.
- Smoke Number (SN) Emission Standards: 14 CFR 34.21 (e)(2); in addition, 40 CFR 87.23(c)(1).
- Carbon Monoxide (CO) Emission Standards: 14 CFR 34.21(d)(1)(ii); in addition, 40 CFR 87.23(c)(1).
- Hydrocarbons (HC) Emission Standards: 14 CFR 34.21(d)(1)(i); in addition, 40 CFR 87.23(c)(1).
- Oxides of Nitrogen (NOx) Emission Standards: 14 CFR 34.23(b)(1); in addition, 40 CFR 87.23(c)(3).
- In addition to the FAA's finding of compliance based on the certification requirements defined in this TCDS, the engine manufacturer has declared that the ICAO emissions standards identified in Annex 16, Volume II, Third Edition, Part III, Chapter 2, Section 2.2.2 for SN, Section 2.3.2 for CO and HC, Section 2.3.2.e.3 for NOx (also known as CAEP/8), and Part II Chapter 2 for fuel venting have also been demonstrated.

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