European Aviation Safety Agency

EASA

TYPE-CERTIFICATE DATA SHEET

Number : IM.E.050
Issue : 01
Date : 19 October 2012
Type : Pratt & Whitney PW4000-94" Series Engines

Models

PW4050
PW4052
PW4056
PW4060
PW4060A
PW4060C
PW4062
PW4062A
PW4152
PW4156
PW4156A
PW4158
PW4160
PW4460
PW4462

List of effective Pages:

Page	1	2	3	4	5	6	7	8	9	10	11							
Issue	01	01	01	01	01	01	01	01	01	01	01							

Page intentionally left blank

I. General

1. Type/Models:

Type: PW4000-94"
Models: PW4050, PW4052, PW4056, PW4060, PW4060A, PW4060C, PW4062, PW4062A
PW4152, PW4156, PW4156A, PW4158, PW4160,
PW4460, PW4462

2. Type Certificate Holder:

Pratt & Whitney Division
United Technologies Corporation
East Hartford, Connecticut 06108
United States of America

3. Manufacturer:

Pratt & Whitney Division
United Technologies Corporation
East Hartford, Connecticut 06108
United States of America

4. Certification Application Date for EASA Certification:

18 April 1986*	for models PW4156 and PW4152
5 April 1988*	for model PW4158
24 October 1988*	for models PW4060, PW4160 and PW4460
6 November 1990*	for model PW4060A
24 October 1991*	for model PW4156A
28 April 1993**	for model PW4462
26 March 1997*	for model PW4056
7 July 1998**	for model PW4062
31 October 2005***	for models PW4050, PW4052, PW4060C and PW4062A

*: Application to DGAC France
**: Application to LBA Germany
***: Application to EASA

5. EASA Certification Reference Date:

For all models: 26 October 1983

6. EASA Certification Date:

PW4152, PW4156	25 May 1987	(1)
PW4158, PW4060, PW4160, PW4460	25 November 1988	(1)
PW4060A	20 March 1991	(1)
PW4156A	6 December 1991	(1)
PW4462	29 June 1995	(2)
PW4056	26 March 1997	(1)
PW4062	22 September 1998	(2)
PW4050, PW4052, PW4060C, PW4062A	19 October 2012	-

(1) EASA Type Certification of the PW4152, PW4156, PW4158, PW4060, PW4160, PW4460, PW4060A, PW4156A and PW4056 engine models is granted, in accordance with Article 3 paragraph 1(a) of EU Commission Regulation EC 748/2012, based on the DGAC France Engine Type Certificate No. M-IM 18 issued prior to 28 September 2003.

(2) EASA Type Certification of the PW4062 and PW4462 engine models is granted, in accordance with Article 3 paragraph 1(a) of EU Commission Regulation EC 748/2012, based on the LBA Germany Engine Type Certificate No. 6323 issued prior to 28 September 2003.

II. Certification Basis

1. FAA Certification Basis:

Refer to FAA TCDS number E24NE, Revision 10 dated 5 December 2008

2. EASA Certification Basis:

Airworthiness Standards:

PW4152, PW4156, PW4158, PW4060, PW4160, PW4460, PW4060A, PW4156A, PW4462, PW4056	JAR-E Change 6, Effective 26 October 1983
PW4050, PW4052, PW4060C, PW4062A	JAR-E Change 6, Effective 26 October 1983 CS-E 790 "Ingestion of Rain and Hail", published 24 October 2003 CS-E 800 "Bird Strike and Ingestion", published 24 October 2003

Special Conditions: None

Equivalent Safety Findings: JAR-E C3-4 22 Rotor Integrity
JAR-E C3-4 2.1 Pressure Tests
JAR-E C3-4 6.6 Maximum Continuous Speed Limitations

Environmental Protection Requirements: For all Models except Models PW4050, PW4052, PW4060C and PW4062A the environmental requirements are those implemented through EASA Basic regulation EC (No.) 216/2008 as amended by (EC) No. 690/2009 and its implementing regulation (EC) No. 1702/2003 annex Part 21, 21A.18 b) including CS-34. By reference the emissions regulations of Amendment 6 of ICAO Annex 16, Volume II become applicable. The regulatory emissions levels are those prescribed in Part III, Chapter 2, paragraph 2.2 and 2.3.2 b) (CAEP/2) of the Annex.

For Models PW4050, PW4052, PW4060C and PW4062A the regulatory emissions levels for NOx are those prescribed in Part III, Chapter 2, paragraph 2.3.2 c) (CAEP/4) of ICAO Annex 16 Volume II.

III.Technical Characteristics

1. Type Design Definition:

		Original	Phase (-3)
PW4050	Parts List	50A100-04	54A900-04
PW4052	Parts List	50A100-02	54A900-02
PW4056	Parts List	50A100-01	54A900-01
PW4060	Parts List	50A100-03	54A900-03
PW4060A	Parts List	A100-05	54A900-05
PW4060C	Parts List	50A100-03 (*)	54A900-03 (*)
PW4062	Parts List	N/A	54A900-06
PW4062A	Parts List	N/A	54A900-07
PW4152	Parts List	50A300-02	55A400-02
PW4156	Parts List	50A300-01	55A400-01
PW4156A	Parts List	50A300-04	55A400-04
PW4158	Parts List	50A300-03	55A400-03
PW4160	Parts List	50A100 BASIC	54A900 BASIC
PW4460	Parts List	50A400-01	55A100-01
PW4462	Parts List	50A400-02	55A100-02

* Incorporates Special Instruction 20F-93 and Service Bulletin PW4ENG 73-202.

2. Description:

Axial airflow, dual-spool, turbofan, single-stage fan, 4-stage low pressure compressor, 11-stage high pressure compressor, annular combustor, 2-stage high pressure turbine, 4-stage low pressure turbine.

3. Dimensions:

Overall Length : 3.90 m (153.6 inches)
Overall Height : 2.48 m (97.5 inches)

4. Dry Weight:

4272.84 kg (9420 lbs)

Note: Weight of basic engine includes all essential accessories, but excludes starter, exhaust nozzle and power source for the ignition system

5. Ratings (Static Thrust at Sea Level, see Notes 1 and 2):

	Take-off (5 minutes)	Maximum Continuous
PW4050	22241 daN (50000 lbs)***	21404 daN (48120 lbs)*
PW4052	23219 daN (52200 lbs)***	22161 daN (49820 lbs)*
PW4056	25244 daN (56750 lbs)***	21338 daN (47970 lbs)** (Boeing 747)
PW4056	25244 daN (56750 lbs)***	22032 daN (49530 lbs)* (Boeing 767)
PW4060A	27387 daN (61570 lbs)***	22352 daN (50250 lbs)*
PW4060C	26689 daN (60000 lbs)***	22352 daN (50250 lbs)*
PW4062	27579 daN (62000 lbs)**	22352 daN (50250 lbs)**
PW4062A	27579 daN (62000 lbs)**	21338 daN (47970 lbs)**
PW4152	23131 daN (52000 lbs)*****	21885 daN (49200 lbs)**
PW4156	24910 daN (56000 lbs)**	22054 daN (49580 lbs)**
PW4156A	24910 daN (56000 lbs)***	21885 daN (49200 lbs)**
PW4158	25800 daN (58000 lbs)**	22054 daN (49580 lbs)**
PW4160	26689 daN (60000 lbs)**	22063 daN (49600 lbs)**
PW4460	26689 daN (60000 lbs)*	22708 daN (51050 lbs)**
PW4462	27579 daN (62000 lbs)**	22708 daN (51050 lbs)**

*: Flat-rated to 25°C
**: Flat-rated to 30°C
***: Flat-rated to 33°C
****: Flat-rated to 35°C
*****: Flat-rated to 42.2°C

6. Control System:

Fuel Metering Unit	Hamilton Standard Model Number JFC-131-2
Fuel Pump and filter	Argo-Tech 825500 Series
Fuel Distribution Valve	Hamilton Standard Model Number GTA40
Electronic Engine Control (EEC)	Hamilton Standard EEC Model Number 131
EEC Alternator; Stator	Unison Industries Part Number 10-621920 Honeywell Part Number 9045465 Unison Part 4 Number 30070
EEC Alternator; Rotor	Unison Industries Part Number 10-621595 Honeywell Part Number 2704480 Unison Part Number 430071
Station 2.5 Bleed Actuator	Hamilton Standard Model Number GTA42
Stator Vane Actuator	Hamilton Standard Model Number GTA41
P2/TT2 Probe	Rosemount Model Number 154 GT

7. Fluids:

Fuel Specification, all Models (see also Note 3): Refer to the latest issue of Pratt & Whitney Turbojet Engine Service Bulletin No. 2016

Oil Specifications, all Models: Refer to the latest revision of Pratt & Whitney Turbojet Engine Service Bulletin No. 238

8. Ignition:

Exciter	Unison Industries Model Number TFN-29
Igniters	PW P/N IC709520

9. Accessory Drive Provisions:

Drive (High Pressure Rotor)	Rotation	Speed Ratio to Turbine Shaft	Torque (Nm) (Continuous)	Torque (Nm - Static)	Overload (Nm)	Overhang (Nm)
Starter	CCW	0.841:1	N/A	1)	N/A	56 (500 lb-in)
IDGS	CCW	0.841:1	2)	1426 (12620 lb-in)	2)	226 (2000 lb-in)
Fluid power pump (R)	CCW	0.389:1	147 (1300 lb-in)	734 (6500 lb-in)	221.5 (1950 lb-in) 3)	45 (400 lb-in)
Auxiliary fluid power pump (R)	CCW	0.379:1	147 (1300 lb-in)	734 (6500 lb-in)	221.5 (1950 lb-in) 3)	45 (400 lb-in)

Notes:
CCW = counterclockwise
N/A = Not applicable

1) Maximum starter torque = 123 daNm (910 lb-ft) at zero rpm and 169 daNm (1250 lb-ft) maximum impact torque. Maximum allowable starter torque value is 2031 Nm (1498 lb-ft).

2) Maximum allowable continuous torque values are equivalent to 130 kW (175 HP) at any engine speed at or above sea level idel. The following overload conditions can be accomodated:

kW (HP)	DURATION TIME	RECURRING TIME
168 (225)	5 minutes	1000 hours
168 (225)	5 seconds	1 hour
336 (450)	5 seconds	1000 hours

3) Maximum allowable for 5 minute duration recurring at four-hour intervals minimum

9. Maximum Permissible Air Bleed Extraction (in % of the primary engine airflow):

8th Stage Bleed	Normal	Maximum
Idle to 40% Maximum Continuous	0.0	0.0
40% Maximum Continuous to Takeoff	6.0	6.0

15th Stage Bleed:	Normal	Maximum
Idle to 40% Maximum Continuous	12.0	12.0
40% Maximum Continuous to Takeoff	1.6	1.6

IV.Operational Limits:

1. Temperature Limits (see also Note 4):

For in-flight starts which result in exceedance of the ground start limit, the maximum temperature and duration must be recorded for maintenance action, the PW4000 Maintenance Manual.

Turbine Exhaust Gas temperature (see also Note 4) °C / °F:

	All models except PW4050, PW4052 and PW4152	PW4050	PW4052	PW4152
At takeoff (5 minutes, see Note 2)	654/1209	625/1157	644/1191	644/1191
Maximum continuous	629/1164	600/1112	629/1164	619/1146
At start-up, ground	535/995	535/995	535/995	535/995
At start-up, in-flight	650/1202	625/1157	640/1184	640/1184

Oil outlet temperature (all Models) °C / °F:

Continuous operation: 163 / 325
Transient operation (limited to 20 minutes): 177 / 350

External Engine Components:
External engine components maximum limiting temperatures are specified in the Installation and Operating Manual, section 4.3.

2. Rotational Speed Limits (rpm, see also Note 4):

Maximum Rotational Speeds

All models except PW4050, PW4052, PW4152, PW4062 and PW4062A		PW4050, PW4052 and PW4152		PW4062 and PW4062A	
Low pressure rotor (N1)	High pressure rotor (N2)	Low pressure Rotor (N1)	High pressure rotor (N2)	Low pressure Rotor (N1)	High pressure rotor (N2
4012	10450	4012	10300	4044	10450

Minimum Rotational Speeds
For inflight operation during icing conditions, the minimum allowable low pressure rotor speed (N1) is 720 rpm.

3. Pressure Limits:

Fuel Pressure Limits: At inlet to engine system pump, not less than 34.5 kPa (5 psig) above the true vapour pressure of the fuel and not greater than 482.6 kPa (70 psig) with a vapour/liquid ratio of zero.

Oil Pressure Limits: Minimum 482.6 kPa (70 psid - differential)
Temporary interruption of oil pressure associated with negative "G" operation is limited to 30 seconds maximum. Normal oil pressure will be restored rapidly once the negative "G" effect has been eliminated. There is no maximum oil pressure limit.

4. Installation Assumptions:

Refer to the applicable Installation and Engine Operation Manuals.

5. Time Limited Dispatch:

The PW4000-94" series engines have been approved to operate with certain faults present in the control system, based on satisfaction of FAR 33 and appropriate FAR25 control system reliability requirements.The following criteria exist as dispatch and maintenance requirements for the engine control system. These criteria are specified in Pratt & Whitney report PWA-6139 and PWA-6139 Addendum, which defines the various configurations and maximum operating intervals as follows:

Fault Level A:	No dispatch allowed
Fault level B:	Dispatchable; maximum operating interval for Fault level B fault(s) is 20 days.
Fault level C:	Dispatchable; maximum operating interval for Fault level C fault(s) is 1000 operating hours. Review of EEC fault data from only the most recent flight leg is sufficient at the 1000 hour interval except for the following EEC part numbers: P&W P/N 50D791, 50D824, 51D037, 50D823, 51D319, 51D586.

Fault Levels A and B constitute Pratt & Whitney nomenclature. The airframe manufacturers may use different nomenclature in adapting these fault categories to the aircraft maintenance and display systems. However, the maximum operating intervals are restricted as shown above.

A control system reliability monitoring program has been established with Pratt & Whitney in compliance with the reporting requirements as outlined in the FAA Engine and Propeller Directorate letter dated October 28, 1993, for Time Limited Dispatch of Engines fitted with FADEC Systems.

V. Operating and Service Instructions

	A300-600/A310	B747-400	B767-200/300	MD-11
Installation and Operating Manual	PWA-6049	PWA-6049	PWA-6049	PWA-6049
Operating Instructions	OI315	OI316	OI317	OI319
Engine Maintenance Manual	P/N 50A444	P/N 50A606	P/N 50A606	P/N 50A823
Engine Manual	P/N 50A443	P/N 50A605	P/N 50A605	P/N 50A822
Illustrated Parts Catalogue	P/N 50A445	P/N 50A607	P/N 50A607	P/N 50A824

VI. Notes

Note 1: The Sea Level Static Ratings are ideal and based on ICAO Standard Atmosphere conditions, a Pratt & Whitney hardwall bellmouth inlet, no fan or compressor air bleed or load on accessory drives, an exhaust system having no internal pressure or external scrubbing losses, and fan duct and primary nozzle velocity coefficients equal to 1.0.

Note 2: The normal 5 minute takeoff limit may be extended to 10 minutes for engine out contingency.

Note 3: Fuel and fuel additives conforming to the latest applicable issue of FAA-approved Pratt & Whitney Turbojet Engine Service Bulletin No. 2016 may be used separately or mixed in any proportions without adversely affecting the engine operation or power output.

Note 4: Limits regarding transient rotor shaft overspeed rpm and transient gas overtemperature and the number of overtemperature occurrences are specified in the applicable Engine Maintenance Manuals (see V. Operating and Service Instructions).

Note 5: Power setting, power checks, and control of engine output in all operations are to be based upon Pratt & Whitney engine charts referring to either turbine discharge section gas pressure or low rotor speed. Pressure probes and a low rotor speed sensor are included in the engine assembly for this reason.

Note 6: Lightning protection requirements and electromagnetic interference emitted by the electronic engine control system, including cables, are specified in the Installation and Operating Manual, Section 4.12

Note 7: Certain engine parts are life-limited. Limits are listed in the applicable Pratt & Whitney PW4000 Turbofan Engine Manual (see V. Operating and Service Instructions), Time Limit Section .

Note 8: The maximum permissible engine inlet distortion limit is specified in the applicable Installation and Operating Manual, Section 4.4, Report PWA-6049.

Note 9: Information regarding approved fuel filter and oil filter replacement parts is contained in the applicable Illustrated Parts Catalog (see V. Operating and Service Instructions).

Note 10: Requirements and limitations associated with automatic fuel system anti-icing are specified in the Installation and Operating Manual, Section 4.5, Report PWA-6049.

Note 11: Engines in which Engineering Change Number EC92KK322G, H, I, J and K were incorporated during manufacture are designated by a (-3) on the Engine Data Plate.

Note 12: For Models PW 4152, PW 4156, PW 4158 and PW 4156A as well as for Models PW4460 and PW 4462, installation of thrust reverser and exhaust system in as per drawing number P/N 221D4012, Revision A as well as drawing number P/N 221D5015, Revision A (wing installation) and P/N 221D5017, Revision A (tail installation) in accordance with FAA STCs No. SJ514NE and SE744NE or later approved revisions is approved.

Note 13: The Airworthiness Directives issued by the Federal Aviation Administration (FAA) before 28 September 2003 are applicable.
