

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

E2WE
Revision 7
AlliedSignal Inc.
(Garrett, AiResearch)
TPE331-25A, -25AA, -25AB,
-25B, -25C, -25D,
-25DA, -25DB, -25E,
-25F, -25FA, 29A
TPE331-43, -43-A, -43-B, -45,
-47, -47-A, -47-B, -51,
-55, -55-A, -55-B, -57,
-57-B, -61, 61-A

March 20, 1998

TYPE CERTIFICATE DATA SHEET NO. E2WE

Engines of models described herein conforming with this data sheet (which is part of Type Certificate No. E2WE) and other approved data on file with the Federal Aviation Administration (FAA) meet the minimum standards for use in certified aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Civil Air Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate (TC) Holder: AlliedSignal Inc.
111 South 34th Street
Phoenix, Arizona 85034

Type Single-shaft, turboprop with two stage centrifugal compressor, three stage axial turbine and single annular combustion chamber

Model (See Note 5)	TPE331-25A, -25AA, -25AB, -25B, -25C, -25D, -25DA, -25DB, -25E, -25F, -25FA, -29A	TPE331-43, -43-A, -43-B, -45, -47, -47-A, -47-B, -51, -55, -55-A, -55-B, -57, -57-B, -61, -61-A
Ratings (see Note 3)		
Maximum continuous SHP	500	---
ESHP	529 (see Note 4)	---
Output shaft speed RPM	2000	---
Exhaust gas temperature °F (°C)	995 (535)	1005 (541)
Takeoff (5 minutes) SHP	575	---
ESHP	605 (see Note 4)	---
Output shaft speed RPM	2000	---
Exhaust gas temperature °F (°C)	1060 (571)	1070 (577)
Gearbox power limit while not exceeding exhaust gas temperature limits:		
Continuous operation	1313 lb-ft	1392 lb-ft
Ram takeoff conditions (5 minutes)	1707 lb-ft	---

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Model (See Note 5)	TPE331-25A, -25AA, -25AB, -25B, -25C, -25D, -25DA, -25DB, -25E, -25F, -25FA, -29A	TPE331-43, -43-A, -43-B, -45, -47, -47-A, -47-B, -51, -55, -55-A, -55-B, -57, -57-B, -61, -61-A
Principal dimensions of basic engine		
Length, Inches	46.01	46.01
Width, Inches	20.18 - 21.32	20.79 - 21.02
Height, Inches	24.71 - 26.6	26.6
C.G. location, inches aft of gearbox rear face	7.1	7.1
C.G. location, inches above engine rotor center line	2.66 - 2.78	2.66 - 3.04
C.G. location, inches to the right of vertical center line when looking into exhaust	0.36 - 0.44	0.25 - 0.36
Weight, dry, lbs.	335	335
Basic engine includes fuel pumps and filter; fuel control unit; fuel shutoff valve; ignition system excluding power source; propeller flange; propeller-tube oil transfer; exhaust thermocouples and harness; lubrication system exclusive of optional oil tank with integral oil-to-fuel heat exchanger and lines; fire shield adapter and oil line shrouding; torque sensor; and engine inlet anti-icing system, valve, electrical harness and plumbing lines.		
Propeller-shaft to engine-rotor ratio	1:20.865	
Fuel	Fuels conforming to AiResearch Manufacturing Company of Arizona Report PE-5064-R	
Oil	Oils conforming to AiResearch Manufacturing Company of Arizona Report PE-5065-R	
Ignition system	AiResearch (Scintilla or General Laboratory Associates) 369913 high-voltage capacitor-discharge type and two igniter plugs, AiResearch (Champion Spark Plug Co. or A.C. Spark Plug Co.) 369812 or (AC Spark Plug Co.) 369949	
Certification basis	CAR 13 in effect on August 30, 1963, the date of application for Type Certificate. Type Certificate No. E2WE issued February 25, 1965.	
Production basis	Production Certificate No. 413 issued March 4, 1965.	
Control system	The following basic control accessories are selected for compatibility with the propeller choice. The propeller selected for use with the engine must have functional characteristics that are compatible with the engine and with the control-system accessories.	
	Fuel Control	865420 or 893000
	Fuel Pump Assembly	868531
	Propeller Governor	865423 or 867374 or 869132
	Propeller Pitch Control	867330 or 867390
	Propeller Tube	866533 or 866678

NOTE 1.	Maximum permissible temperature:	TPE331-25A, -25AA, -25AB, -25B, -25C, -25D, -25DA, -25DB, <u>-25E, -25F, -25FA, -29A</u>	TPE331-43, -43-A, -43-B, -45, -47, -47-A, -47-B, -51, -55, -55-A, <u>-55-B, -57, -57-B, -61, -61-A</u>
	Exhaust gas temperature		
	Maximum continuous	995°F. (535°C.)	1026°F. (552°C.)
	Takeoff (5 minutes)	1060°F. (571°C.)	1070°F. (577°C.)

The above takeoff and maximum continuous exhaust gas temperatures are for ARDC Model Atmosphere, Standard sea-level day static conditions. To maintain constant turbine inlet temperature, exhaust gas temperature will vary as a function of ambient conditions. Consult the manufacturer's operation manual for other than standard sea-level day operations.

Starting	Not to exceed 1500°F. (815°C.) for one second
Oil inlet temperature	Minus 40°F. (minus 40°C.) to 260°F. (127°C.) MIL-L-23699 Minus 40°F. (minus 40°C.) to 200°F. (93°C.) MIL-L-78080
Ambient air temperature	Minus 65°F. (minus 54°C.) to 125°F. (52°C.).
External engine components	Ignition leads 500°F. (260°C.) Igniter plugs 550°F. (288°C.) Thermocouple harness (850°F. (454°C.) Fuel shutoff valve 250°F. (121°C.) Fuel control assembly 265°F. (130°C.)
Engine zones	Zone 1 (forward of the fire-shield adapter) 200°F. (93°C.) Zone 2 (aft of the fire-shield adapter up to the turbine exhaust-diffuser split line) 450°F (232°C.) Zone 3 (aft of the turbine exhaust-diffuser split line) 750°F. (399°C.)

NOTE 2.	Pressure limits:
Inlet air pressure	Sea level to 30,000 feet altitude
With fuels conforming to those specified above, fuel pressure at inlet connection to the engine.	Minus 3.0 psig at altitudes up to 15,000 feet; and 5 psig above true vapor pressure, or that which will maintain the vapor-liquid ratio between 0 and 0.45 for altitudes of 15,000 feet and above. The inlet fuel pressure at all altitudes shall not exceed 50 psig maximum.
Fuel	See AiResearch Manufacturing Company of Arizona Report PE-5064-R.
Oil pressure at inlet connection to the engine.	Not to exceed a 12-inch negative head.
Oil operating pressure	70 to 120 psig

NOTE 3. The engine ratings are based on: Dynamometer operation at ARDC Model Atmosphere, sea level static conditions. Compressor inlet air (dry) 59°F. (15°C.), 29.92 in.Hg. MIL-J-5624F-2, Grade JP-4, fuel with lower heating value of 18,400 Btu per pound and MIL-L-23699 (WEP) -2 type oil, Mobil Oil Jet II. No bleed-air extraction, no anti-icing airflow, and no external accessory loads. Zero inlet duct loss. Exhaust gas discharging to ambient static pressure through the turbine exhaust diffuser furnished with the engine. Measured exhaust-gas temperature as indicated by average of the exhaust gas temperature thermocouples.

NOTE 4. Equivalent shaft horsepower (ESHP) is based on $ESHP = \frac{\text{jet thrust lb.}}{2.5} + SHP.$

NOTE 5. Accessory drive provisions:

Nominal Use	Type of Drive (one each)	Speed Ratio to Engine Rotor	Rotation ⁴ Facing Drive Pad	Maximum Torque Continuous (lb.-in.)	Maximum Torque Overload (lb.-in.)	Maximum Torque Static (lb.-in.)	Overhung Moment (lb.-in.)	Drive ⁵ Speed (rpm)
Tachometer - Generator	AND20005 ¹ Type XV-B	0.100	CW per AND	7 per AND	--	50 per AND	25	4,187 per AND
Starter or starter generator	AND20002 ² Type XII-D (modified)	0.261	CW per AND	300	600	2,200 per AND	500 per AND	10,886
Aircraft Accessory	AND20001 ³ Type XI-B (modified)	0.096	CCW	250 per AND	375 per AND	1,650 per AND	125 per AND	3,959
Propeller governor	AND20010 ¹ Type XX-A (modified)	0.090	CW per AND	125 per AD	188 per AND	825 per AND	125	3,754
Propeller pitch control			Mounting pad provided.				30	NONE

¹Same as AND except as shown in the table and except for stud length.

²Same as AND except as shown in the table and except that studs are rotated 30° from standard pad configuration.

³Same as AND except as shown in the table.

⁴CW = Clockwise; CCW = Counterclockwise

⁵Drive speed at takeoff engine-rotor speed of 100 percent

NOTE 6. Bleed-air extraction above ground idle is permissible up to 5 percent of compressor non-bleed airflow when the anti-icing system is not in use and up to 3 percent of compressor non-bleed airflow when the anti-icing system is in use.

NOTE 7. The maximum allowable propeller shaft speed is 2,100 rpm for a transient period not to exceed 5 seconds.

NOTE 8. Phillips PFA-55MB (MIL-I-27686) jet fuel anti-icing additive is approved for use in fuels in amounts not to exceed 0.15 percent volume.

NOTE 9. These engines meet FAA requirements for adequate turbine disc integrity and rotor blade containment and do not require external armoring.

NOTE 10. These engines meet FAA requirements for operation in icing conditions.

NOTE 11. Propeller shaft is bolted-flange type with clockwise rotation when looking into turbine exhaust.

NOTE 12. Shell ASA-3 anti-static additive, or equivalent, in amounts to bring the fuel up to 300 conductivity units is permissible except that in no event shall the additive exceed 1 ppm.

NOTE 13. Engine with an "L" stamped after the model number (25AL) have the 75 percent low ground idle kit installed. This increased the weight of the engine 11 oz. and does not change the C.G. Low ground idle kits should be installed on engine models as shown in the following chart:

<u>Engine Model</u>	<u>Low Ground Idle Kit</u>
TPE331-25A, -25AA, -25AB	869063-1
TPE-331-25D, -25DA, -25DB	869362-1
TPE331-25F, -25FA	869363-1
TPE331-43, -43-A, 43-B	869361-1
TPE331-47, -47-A, -47-B	869360-1
TPE331-55, -55-A, -55-B	869743-1
TPE331-57, -57-B	869744-1
TPE331-61, -61-A	893152-1

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