

**MINISTÉRIO DA AERONÁUTICA
DEPARTAMENTO DE PESQUISA E DESENVOLVIMENTO
CENTRO TÉCNICO AEROESPACIAL**

TYPE CERTIFICATE DATA SHEET N° EM-9703

Type Certificate Holder:
INTERNATIONAL AERO ENGINES AG
400 Main Street, M/S 121-10
East Hartford, CT 06108
U. S. A.

EM-9703-00
PAGE 01
IAE
V2500 - A1
JUNE, 1997

Engines of models described herein conforming with this data sheet, which is a part of Type Certificate N° 9703, meet the minimum standards for use in certificated aircraft in accordance with the applicable portions of the Brazilian Requirements for Airworthiness certification - RBHA - provided they are installed, operated and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

MODEL	V2500-A1
TYPE	Dual rotor, axial flow, high bypass turbofan, single-stage fan, three-stage, low pressure compressor, 10-stage high pressure compressor, annular combustor, two-stage, high-pressure turbine, five-stage, low pressure turbine.
RATINGS (NOTE 5)	Maximum continuous at sea level, static thrust, lb 22,240 Takeoff (5 min.) at sea level, static thrust, lb 24,800
COMPONENTS	For information refer to the Installation and Operating Manual (IOM), Installation Handbook; Illustrated Parts Catalogue or Approved Parts List.

PRINCIPAL DIMENSIONS (in)

Length..... 126.0205
 Normal diameter 66.4
 Maximum radial projection..... 43.7

WEIGHT (DRY)

Includes all essential accessories, but excludes starter, exhaust nozzle, and power source for the ignition system)
 2,404 kg / 5,300 lb

CENTER OF GRAVITY (in)

Aft of front mount area centerline 14.30 ± 1.0
 Below engine centerline 2.20 ± 0.5
 Starboard of engine vertical centerline..... 0.3 ± 0.5

FUEL

(See NOTE 10)

OIL

(See NOTE 11)

CERTIFICATION BASIS

Date of Type Certificate

RBHA/FAR 33, effective February 1, 1965, as amended by 33-1 through 33-10 inclusive.

Model

Date of Application

N° 9703 Issued/Revised

2500-A1

September 13, 1996

June 13, 1997

PRODUCTION BASIS

Production Certificate N° 114NE (FAA)

NOTE 1

Maximum permissible engine operating speeds for the engine rotors as follows:

Low Pressure rotor (N1), RPM 5,465 (100%)

High Pressure rotor (N2), RPM 14,915 (100%)

NOTE 2

Maximum permissible temperatures are as follows:

Turbine Exhaust Gas Temperature (See NOTE 18)

Take off (5minutes)650°C/1202°F actual; 635°C/1175°F indicated

Maximum Continuous615°C/1139°F actual; 610°C/1130°F indicated

Start Groun / Inflight.....635°C/1175°F

Oil Outlet Temperature

Continuous operation.....155°C/311°F

Transient operation (15 minutes).....165°C/329°F maximum

External engine component maximum limiting temperatures are specified in the Installation and Operating Manual, Section 4.3.

NOTE 3

Fuel and oil pressure limits.

Fuel Pressure At inlet to engine system pump, not less than 5 psig above the true vapor pressure of the fuel and not greater then 70 psig with a vapor/liquid ratio of zero.

Oil Pressure 60 psig minimum.

NOTE 4

Maximum Permissible Air Bleed Extraction is as Follows:

Station	Airflow Maximum Bleed Limit % of Inlet Core Flow (WA26)
7th Stage Bleed	
At or Below 91% corrected high rotor speed	7.7%
Above 91% corrected high rotor speed	Less than 7.7%*
10th Stage Bleed	
At or Below 60% corrected high rotor speed	12%
Above 60% corrected high rotor speed	Less than 7.7%*

*Permissible air bleeds limits are provided in the Installation and Operating Manual, Section 4.1, Figure 4.

** Simultaneous use of 7th and 10th stage bleed at limiting conditions is allowed only when required by a malfunction and only until the next landing.

NOTE 5

The ratings are based on Sea Level Static lost stand operation under the following condition:

- Engine inlet air at 59°F and 29.92 in.Hg.
 - Specified fuel and oil.
 - No fan or compressor air bleed or load on accessory drives.
 - Ideal inlet pressure recovery.
 - A mixed exhaust system having no internal pressure losses and a mixed primary nozzle velocity coefficient equal to 1.0.
 - Takeoff rating is a maximum thrust certified for takeoff operation.
 - The specified takeoff thrust is available at and below ISA + 27°F (15°C) ambient temperature.
 - Maximum Continuous rating is the maximum thrust certified for continuous operation. The specified thrust is available at and below ISA + 18°F (10°C) ambient temperature.
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NOTE 6

The following accessory drive provisions are incorporated:

Drive	Speed Ratio	Continuous	Torque (lb in)	
			Static	Overload
Starter (ccw)	0.941 N2	(A)	(A)	(A)
Hydraulic Pump (ccw)	0.267 N2	1300	6500(B)	1950
Integrated Drive				
Generator System (ccw)	0.064 N2	(C)	1,100	(C)
Fuel Pump (ccw)	0.427 N2	650(C)	3500	975(B)

ccw - counter clockwise

A - Strength of starter drive shall be adequate for a starter delivering maximum torque of 470 lb. ft. at zero RPM and 1175 lb. ft. maximum impact torque.

The engine starter drive shear section is designed to fail at a static torque of 940-1081 lb.ft.

B - Maximum allowable for 5-minutes duration recurring at 4 hour intervals.

C - Maximum allowable continuous torque values are equivalent to 176 horsepower at an engine speed at or above sea level ground idle. The drive is designed to accommodate the following overload conditions:

Horsepower	Duration Time	Recurring Time
225	5 minutes	1,000 hours
225	5 seconds	1 hour
450	5 seconds	1,000 hour

NOTE 7

Power setting, power checks, and control of engine output in all operations is to be based upon International Aero Engines AG 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 8

For inflight operation during icing conditions, the minimum allowable fan speed is 25.6% (1,400 RPM).

NOTE 9

Lightning protection requirements and electromagnetic interference emitted by the electronic engine control system including cables are specified in the V2500 Installation and Operating Manual, Section 4.12.

NOTE 10

Fuel and fuel additives conforming to the specifications specified in V2500 Installation and Operation Manual, Section 4.5 may be used separately or mixed in any proportions without adversely affecting the engine operation or power output.

NOTE 11

Specific oil brands approved for use are identified in the V2500 Installation and Operating Manual, Section 4.9.

NOTE 12

Certain engine parts are life limited. These limits are listed in the FAA-approved International Aero Engines AG V2500 turbofan Engine Manual, Chapter 5, Time Limit Section.

NOTE 13

The engines meet the January 1, 1984, smoke and gaseous emission requirements of FAR 34.

NOTE 14

The engines meet the January 1, 1975, fuel venting emissions requirements of FAR 34.

NOTE 15

The maximum permissible V2500 engine inlet distortion limit is specified in the V2500 Installation and Operating Manual, Section 4.4.

NOTE 16

Limits regarding transient rotor shaft overspeed rpm, and transient gas temperature and the number of overtemperature occurrences, are specified in the Maintenance Manual.

NOTE 17

Time limited dispatch (TLD) limits for the V2500-A1 FADEC control system are listed in the V2500 Installation and Operating Manual (IOM) (IAE-0043), Section 4.13. The technical data substantiating the IOM TLD limits are contained in IAE V2500 Reports IAE-0184, PWA-6189, and PWA-6243.

NOTE 18

Electronic Engine Control (EEC) software version SCN11G and earlier versions have maximum permissible exhaust gas temperatures (actual and indicated) of 635°C for takeoff (5 minutes) and 610°C for maximum continuous. To provide adequate margin for consolidated bump rating operation, EEC software version SCN11H to SCN 12 B/N can provide maximum permissible EGT of 640°C actual (635°C indicated) for non-bump takeoff, 650°C actual (635°C indicated) for consolidated bump takeoff, and 615°C actual (610°C indicated) for maximum continuous. EEC software version SCN12C provides a maximum permissible EGT of 650°C actual (635°C indicated) for takeoff and 615°C actual (610°C indicated) for maximum continuous with or without consolidated bump usage. The noted engine ratings and limits are controlled by EEC P/N and Data Entry Plug (DEP) P/N, and are implemented by specific Service Bulletin instructions only. The engine data plate also reflects the engine ratings and limits configuration. The indicated vs. actual EGT values are controlled by EEC software.

NOTE 19

The Brazilian Supplemental Type Certificate number 9706-01 was issued to validate the FAA Supplemental Type Certificate SE636NE with approves the installation of a fan thrust reverser and exhaust system (P/N 740D8018) on the V2500-A1 series models. The thrust reverser/exhaust system consists of the thrust reverser, common nozzle assembly, tail plug, and pylon installation kit, and consists of parts listed in IAE Thrust Reverser Type Design Bill-of-Material, Serial No. N0009.

NOTE 20

Model Description:

V2500-A1 Basic Model

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