

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

TYPE CERTIFICATE DATA SHEET N° EM-9704

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

EM-9704-01
PAGE 01
IAE
V2522 - A5; V2524 - A5;
V2527 - A5; V2527E - A5;
V2530 - A5; V2533 - A5;
V2525 - D5; V2528 - D5;
V2527M-A5
July 2005

Engines of models described herein conforming with this data sheet, which is part of Type Certificate No. 9704 meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Brazilian Aeronautical Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other instructions.

MODELS	V2522-A5	V2524-A5	V2527-A5/ V2527E-A5/ V2527M-A5	V2530-A5	V2533-A5	V2525-D5	V2528-D5
TYPE	Dual rotor, axial flow, high bypass turbofan, single-stage fan; four-stage low pressure compressor, ten-stage high pressure compressor, annular combustor, two-stage high-pressure turbine, five-stage low pressure turbine.						
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Legend: "--" = same as preceding model "#" = does not apply

RATINGS (See NOTE 5)	V2522-A5	V2524-A5	V2527-A5/ V2527E-A5/ V2527M-A5	V2530-A5	V2533-A5	V2525-D5	V2528-D5
Maximum. continuous at sea level, static thrust, lb	19 200	19 200	22 240	26 950	26 950	23 900	25 660
Takeoff (5 min.) at sea level, static thrust, lb	22 390 OEI (NOTE 21)	22 780	22 800	29 900	31 600	25 000	28 000
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	--	--	--	126.0205	126.0205	--
Normal diameter	66.23				66.23	66.23	
Maximum radial projection	43.048				43.048	43.665	
WEIGHT (DRY) (All models)							
Includes all essential accessories, but excludes starter, exhaust nozzle, and power source for the ignition system for the -A5 series, and exhaust nozzle for the -D5 series, kg (lb)	2 404 (5 300)						

CENTER OF GRAVITY (in) All ModelsAft of front mount area
centerline 15.7 ± 1.0

Below engine centerline 1.7 ± 0.5

Starboard of engine vertical
centerline 0.7 ± 0.5**FUEL** (See NOTE 10)**OIL** (See NOTE 11)**CERTIFICATION BASIS**

Date of Type Certificate

For V2530-A5/V2527-A5/V2527E-A5/V2528-D5/V2525-D5:

RBHA 33 corresponding to FAR 33, effective 01 February 1965, as amended by 33-1 through 33-14 inclusive.

For V2522-A5/V2524-A5/V2533-A5/V2527M-A5:

RBHA 33 corresponding to FAR 33, effective 01 February 1965, as amended by 33-1 through 33-14, inclusive; and RBHA/FAR 33.28, Amendment 33-15.

<u>Model</u>	<u>Date of application</u>	<u>Issued/Revised</u>
V2530-A5 / V2527-A5 / V2527E-A5	13 September 1996	13 June 1997
V2533-A5 / V2525-A5	28 April 1997	13 June 1997
V2522-A5 / V2525-D5 / V2528-D5	15 May 1997	13 June 1997
V2527M-A5	18 June 2004	18 July 2005

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	5 650 (100%)
High Pressure rotor (N2), rpm	14 950 (100%)

NOTE 2 Turbine Exhaust Gas Temperature
(Actual/Indicated °C) (See NOTE 19)

	V2530-A5	V2527-A5/ V2527E-A5/ V2527M-A5	V2522-A5/ V2524-A5	V2525-D5	V2528-D5	V2533-A5
Takeoff (5 min)	650/650	645/635	620/620	--	635/635	670/650
Maximum	610/610	--	--	--	--	610/610
Continuous						
Start Ground	635/635	--	--	--	--	--
Inflight	635/635	--	--	--	--	--

Oil Outlet Temperature (All models):

Continuous operation °C (°F)	155 (311)
Transient operation (15 minutes)	165 (329) maximum

* The cockpit and aircraft flight manuals for SCN9A (V2527-A5) will reflect a ground and air start limit of 635°C, but the ECC software allows an actual limit of 645°C. All other and subsequent software versions have a software limit of 635°C.

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 than 70 psig with a vapor/liquid ratio of zero.
Oil Pressure	60 psig minimum.

NOTE 4 Maximum Permissible Air Bleed Extraction for the V2522-A5/V2524-A5/V2527-A5/V2530-A5/V2527E-A5/V2533-A5/V2527M-A5 is as follows:

Station: Maximum Bleed Limit (2) (% of Inlet Core Flow (WA26))

7th Stage Bleed:

At or Below 90%

Corrected high rotor speed 8.2%

From 90% to 97%

Corrected high rotor speed Linear variation from

8.2% to 6.0%

At or above 97%

Corrected high rotor speed 6.0%

10th Stage Bleed (1):

At or Below 61%

Corrected high rotor speed 13.7%

From 61% to 78%

Corrected high rotor speed Linear variation from

13.7% to 12.0%

From 78% to 97%

Corrected high rotor speed Linear variation from

12% to 6.0%

At or above 97%

Corrected high rotor speed 6.0%

(1) No 10th Stage bleed allowed below 22 000 ft. at Max. Continuous Rating and above.

(2) 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 4
(Cont.)**

Maximum permissible air bleed extraction for the V2525-D5/V2528-D5 is as follows:

Single Stage Bleed: Max Single Stage Bleed Limit (2) (% of core flow (WA26));

7th Stage Bleed:

At or below 100% corrected N2 9.2%

10th Stage Bleed (1):

From min. idle to 65% corrected N2 linear variation from 16% to 18%(5)

From 65% to 75% corrected N2 linear variation from 18% to 16%

From 75% to 84% corrected N2 16%

From 84% to 97.5% corrected N2 linear variation from 16% to 7%

From 97.5% to 100% corrected N2 7%

Mixed Stage Bleed: Max Mixed Stage Bleed Limit(3) (% of core flow (WA26))

7th Stage Bleed(4):

From 79% to 86.5% corrected N2 linear variation from 9% to 9%

From 86.5% to 96% corrected N2 9%

10th Stage Bleed(4):

From 79% to 84% corrected N2 16%

From 84% to 93.6% corrected N2 linear variation from 16% to 4%

From 93.6% to 96% corrected N2 4%

(1) Below 24 000 ft.:

- at ambient temperatures above 40°F, no 10th stage bleed is allowed at Max. Continuous Rating and above.

- at 40°F ambient temperature and below, a maximum of 2% 10th stage bleed is allowed at takeoff rating and 4% 10th stage bleed at Max. Continuous Rating.

(2) The allowable 7th and/or 10th stage bleed is in addition to the bleed used for inlet cowl anti-icing.

(3) Simultaneous use of 7th and 10th stage bleed is allowed at any power condition due to malfunction and only until the next landing.

(4) When simultaneous bleed flow is required, the addition of the 7th and 10th stage bleed may not exceed the total extraction limits shown below.

(5) 18% for ambient temperatures of 30°F and below only.

NOTE 4 (Cont.)	<u>Total Simultaneous Bleed Flow</u>	Max Combined Bleed Limit (%WA26)
	From 79% to 80% corrected N2	linear variation from 16% to 16.5%
	From 80% to 87.5% corrected N2	16.5%
	From 87.5% to 91% corrected N2	linear variation from 16.5% to 12.5%
	From 91% to 96% corrected N2	12.5%

- 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 (see NOTES 10 and 11).
 - 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.

V2530-A5 & V2533-A5	V2527-A5/ V2527E-A5/ V2527M-A5	V2522-A5/ V2524-A5	V2528-D5	V2525-D5
ISA + 15°C(27°F)	ISA + 31°C(56°F)	ISA + 40°C(72°F)	ISA + 15°C(27°F)	ISA + 15°C(27°F)

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.

- NOTE 6** The accessory drive provisions shown in the following tabulation are incorporated in the V2530-A5 / V2527-A5/V2527E-A5/ V2522-A5 / V2524-A5 / V2533-A5 / V2527M-A5.

**NOTE 6
(Cont.)**

Drive	Rotation	Speed Ratio to Turbine Shaft	Torque (lb.-in.)	Torque Static (lb.-in.)	Overload	Overhang (lb.-in.)
Starter	CCW	0.941:1	-	*	-	550
IDGS	CCW	0.604:1	**	11 000	**	800
Fluid Power Pump	CCW	0.267:1	1 300	6 500	1 950	400

CCW = counterclockwise

* Maximum starter torque = 470 lb.ft at zero rpm. The maximum allowable starter torque value is 1175 lb.-ft.

** Maximum allowable continuous torque values are equivalent to 175 hp at any engine speed. The following overload conditions can be accommodated.

Horsepower	Duration Time	Recurring Time (Hours)
225	5 minutes	1 000
225	5 seconds	1
450	5 seconds	1 000

The accessory drive provisions shown in the following tabulation are incorporated in the V2528-D5 / V2525-D5.

Drive	Rotation	Speed Ratio to Turbine Shaft	Torque (lb.-in.)	Torque Static (lb.-in.)	Overload	Overhang (lb.-in.)
Starter	CCW	0.941:1	-	*	-	550
VSCF	CCW	1.582:1	**	5 500	**	1 000
Fluid Power Pump	CCW	0.275:1	1 100	4 570	2 100	100

CCW = Counterclockwise

* Maximum starter torque = 470 lb.-ft. at zero rpm. The maximum allowable starter torque value is 1175 lb.-ft.

** Maximum allowable continuous torque values are equivalent to 140 hp at any engine speed. The following overload conditions can be accommodated.

Horsepower	Duration Time	Recurring Time (Hours)
167	5 minutes	1 000
225	5 seconds	1
335	5 seconds	1 000

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- 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 in-flight operation during icing conditions, the minimum allowable fan speed is 24.8% (1 400 rpm).
- NOTE 9** Lightning and EMI protection capability of the electronic engine control system, including cables, are specified in the V2500-A5/-D5 Installation and Operating Manual, (IAE-0043/IAE-0174), Section 4.12.
- NOTE 10** Fuels and fuel additives conforming to the specifications listed in the latest applicable issue of the International Aero Engines V2500A5/-D5 Installation and Operating Manual (IAE-043) (IAE-0174). These fuels may be used separately or mixed in any proportions without adversely affecting the engine operation or power output.
- NOTE 11** Oils conforming to the specifications listed in the International Aero Engines V2500-A5/-D5 Installation and Operating Manual (IAE-0043) (IAE-0174), latest revision, are approved for use in the V2500-A5/-DE5 engine.
- NOTE 12** The V2500-A5/-D5 engines meet Federal Aviation Administration requirements for adequate turbine disk integrity and rotor blade containment and does not require external armoring. Certain engine parts are life limited. These limits are listed in the FAA approved International Aero Engines AG V2500 Turbofan Engine Manual. Time Limit Section, Chapter 5.
- NOTE 13** The engine meets the smoke and hydrocarbon emission requirements of RBHA/FAR 34 and the carbon monoxide and nitrogen oxide requirements of International Civil Aviation Organization Standards.
- NOTE 14** The V2500-A5/-D5 engine meets the fuel venting emissions requirements of RBHA/FAR 34.
- NOTE 15** The maximum permissible V2500-A5/-D5 engine inlet distortion limit is specified in the International Aero Engines V2500-A5/-D5 Installation and Operating Manual (IAE-0043/IAE-0174).
- NOTE 16** Information regarding transient rotor shaft overspeed rpm, as well as transient gas overtemperature and number of overtemperature occurrences, is specified in the Maintenance Document.

- NOTE 17** The Brazilian Supplemental Type Certificate 9706-02 was issued to validate the FAA Supplemental Type Certificate SE1091NE which approves the installation of a fan thrust reverser and exhaust system on the V2500-A5 series models. The thrust reverser/exhaust system identified as Drawing Number 747D8018, consists of the fan 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. N5004.
- NOTE 18** Time limited dispatch (TLD) limits for the V2500-A5/-D5 FADEC control system are listed in the V2500 Installation and Operating Manual (IOM) (IAE-0043; V2500-A5) (IAE-0174; V2500-D5), Section 4.13. The technical data substantiating the IOM TLD limits are contained in IAE V2500 Reports IAE-0184 (V2500-A5), PWA-6564, and PWA-6243.
- NOTE 19** EEC software provides the capability of biasing indicated versus actual EGT values so as to provide consistent displayed EGT limit values to the aircraft. The actual versus indicated EGT values are controlled by a combination of EEC software, and Data Entry Plug (DEP) wiring scheme. Engine EGT limits are controlled by EEC P/N and DEP P/N, and are only implemented by specific service bulletin instructions. The engine data plate also reflects the engine limits configuration. NOTE 2 gives the maximum permissible approved EGT values for individual engine models, although these maximum values may not be implemented on all models. See the Installation and Operating Manual, Document No. IAE-0174(D5) or IAE-0043(A5), for information defining the EGT limit values currently assigned to specific engine models.
- NOTE 20** Model Description:
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|---|--|
| V2527-A5: Basic Model, Airbus A320 applications | V2527M-A5: Enhanced climb thrust for Airbus A319 applications. |
| V2530-A5: Basic Model, Airbus A321 applications | V2522-A5: Reduced thrust model, Airbus A319 applications. |
| V2528-D5: Basic Model, MD-90 Applications | V2524-A5: Reduced thrust model, Airbus A319 applications. |
| V2525-D5: Basic Model, MD-90 Applications | V2533-A5: Increased takeoff thrust, Airbus A321 applications. |
| V2527E-A5: Enhanced takeoff thrust model. Airbus A320 applications. The V2527E-A5 provides increased takeoff thrust at altitudes above sea level relative to the V2527-A5 base model. | |
- NOTE 21** Use of takeoff thrust for more than five minutes (not to exceed ten minutes) is approved for use only in the event of an inoperative engine due to shutdown or failure.

GERALDO CURCIO NETO Ten Cel Av
 Chefe da Divisão de Certificação de Aviação Civil
 (Chief, Divisão de Certificação de Aviação Civil)

LUIZ ALBERTO C. MUNARETTO Cel Av
 Diretor do Instituto de Fomento e Coordenação Industrial
 (Director, Instituto de Fomento e Coordenação Industrial)