TYPE-CERTIFICATE DATA SHEET

No. IM.E.069

for Engine
V2500-A5, V2500-D5, V2500-E5 Series

Type Certificate Holder
International Aero Engines AG (IAE)

International Aero Engines AG (IAE)
c/o IAE Airworthiness
400 Main Street
East Hartford, CT 06118
United States of America

For Models:
V2522-A5
V2524-A5
V2527-A5
V2527E-A5
V2527M-A5
V2530-A5
V2533-A5

V2525-D5
V2528-D5

V2531-E5

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I. General

1. Type / Models

V2500-A5, V2500-D5, V2500-E5	V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5
	V2525-D5, V2528-D5
	V2531-E5

2. Type Certificate Holder

International Aero Engines AG (IAE)
c/o IAE Airworthiness
400 Main Street
East Hartford, CT 06118
United States of America

3. Manufacturer

International Aero Engines AG (IAE)
Same address

4. Date of Application

V2527-A5, V2530-A5	12 February 1993
V2527E-A5	04 August 1995
V2522-A5, V2524-A5, V2533-A5	13 September 1996
V2527M-A5	27 April 1999

V2525-D5, V2528-D5	12 February 1993

V2531-E5	09 April 2015

(See note 9)

5. EASA Type Certification Date

V2527-A5	21 July 1993
V2530-A5	29 November 1993
V2527E-A5	14 September 1995
V2522-A5, V2524-A5	06 December 1996
V2533-A5	14 February 1997
V2527M-A5	24 June 1999

V2525-D5, V2528-D5	29 November 1993

V2531-E5	20 June 2017

EASA Type Certification for these engine models is granted, in accordance with Article 3 paragraph 1.(a) of COMMISSION REGULATION (EU) No 748/2012, based on one or more EU member state approvals prior to 28 September 2003. The certification dates have been taken from the DGAC-France Engine Type Certificate N° M-IM 31.
(See note 9)

II. Certification Basis

1. State of Design Authority Certification Basis
Refer to FAA TCDS No. E40NE

2. Reference Date for determining the applicable airworthiness requirements
18 May 1993

3. EASA Certification Basis

3.1. Airworthiness Standards

V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5, V2525-D5, V2528-D5	JAR-E Change 8 dated 4 May 1990

V2531-E5	JAR-E Change 8 dated 4 May 1990 Amendment E/91/1 dated 27 May 1991 Amendment E/93/1 dated 17 May 1993 CS-E 790 "Ingestion of Rain and Hail" Amendment 3 dated 23 December 2010 CS-E 800(d) "Medium and small birds ingestion tests" amendment 3 dated 23 December 2010

3.2. Special Conditions (SC)

V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5 V2525-D5, V2528-D5	SC1 – Bird Strikes SC2 – Inclement Weather Defined by DGAC-F letter 53605/SFACT/N.ME dated 07 June 1993

V2531-E5	None

3.3. Equivalent Safety Findings (ESF): None

3.4. Deviations: None

3.5. Environmental Protection

V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5 produced before serial number S/N V15001(included) V2525-D5, V2528-D5	ICAO Annex 16 Volume II, second edition, including Amendment 2, effective 11 November 1993, as applicable to turbofan engines. NOx Standard in accordance with Part III, Chapter 2, § 2.3.2, b) (CAEP/2)
V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5 produced after serial number S/N V15002 (included) V2531-E5	CS-34 Amendment 3 as implemented by ED Decision 2019/014/R (29th July 2019); ICAO Annex 16 Volume II, Amendment 9 (1st January 2018) as implemented into EU legislation 11/09/2018 ; NOx levels in compliance with Part III, Chapter 2, paragraph 2.3.2d) (CAEP/6) of the above mentioned Annex. Maximum nvPM mass concentration levels in compliance with Part III, Chapter 4, paragraph 4.2.2 (CAEP/10) of the above mentioned Annex.

(See note 10)

III. Technical Characteristics

1. Type Design Definition

	Parts List
V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5	4W5198
V2525-D5, V2528-D5	4W5199
V2531-E5	4W5200E01 (installed) 4W5200S01 (spare)

The “spare” part list is the same as the “installed” one with the exception of the engine starter and starter air valve which are removed.

2. Description

Dual rotor, axial flow, high bypass ratio turbofan engine:

- single stage fan, 4-stage Low Pressure Compressor (LPC), 10-stage High Pressure Compressor (HPC)
- annular combustion chamber
- 2-stage High Pressure Turbine (HPT), 5-stage Low Pressure Turbine (LPT)
- dual channel Full Authority Digital Engine Control (FADEC)

3. Equipment

The engine starter is part of the engine type design. Refer to the engine Parts List for details.

4. Dimensions (mm)

Overall Length	Width	Maximum Radial Projection
3201	1682	V2500-A5: 1093 V2500-D5: 1109 V2500-E5: 1093

5. Dry Weight (kg)

V2500-A5: 2404
V2500-D5: 2595
V2500-E5: 2404
Includes all essential accessories, but excludes starter, exhaust nozzle, and power source for the ignition system for the -A5/-E5 series, and exhaust nozzle for the -D5 series.

6. Ratings

Take-Off Thrust				
V2522-A5	V2524-A5	V2527-A5 V2527E-A5 V2527M-A5	V2530-A5	V2533-A5
10248 daN	10889 daN	11031 daN	13300 daN	14056 daN

Take-Off Thrust				
V2525-D5	V2528-D5	V2531-E5	-	-
11120 daN	12455 daN	13936 daN	-	-

Maximum Continuous Thrust				
V2522-A5	V2524-A5	V2527-A5 V2527E-A5 V2527M-A5	V2530-A5	V2533-A5
8540 daN	8540 daN	9892 daN	11987 daN	11987 daN

Maximum Continuous Thrust				
V2525-D5	V2528-D5	V2531-E5	-	-
10631 daN	11414 daN	11312 daN	-	-

(See notes 1 and 2)

7. Control System

The software is part of the engine Type Design – At initial certification:

- V2500-A5: Version SCN-10
- V2500-D5: Version SCN-11
- V2500-E5: Version SCN-1

8. Fluids (Fuel, Oil, Coolant, Additives)

Fuels and fuel additives conforming to the specifications listed in the applicable engine "Installation and Operating Manual" document are approved for use. These fuels may be used separately or mixed in any proportions without adversely affecting the engine operation or power output.

Oils conforming to the specifications listed in the applicable engine "Installation and Operating Manual" document are approved for use.

9. Aircraft Accessory Drives

V2500-A5, V2500E5						
Drive	Rotation	Gear ratio / HP rotor	Continuous Torque (daN.m)	Static Torque (daN.m)	Overload Torque (daN.m)	Overhung Moment (daN.m)
Engine Starter	CCW	0.941	-	*	-	6.2
Aircraft Electrical Generation	CCW	0.604	**	124.3	**	9
Aircraft Hydraulic Generation	CCW	0.267	14.7	73.5	22	4.5

CCW = Counter Clock-Wise

* Maximum starter torque = 63.7 daN.m at zero rpm. The maximum allowable starter torque value is 159.3 daN.m.

** Maximum allowable continuous torque values are equivalent to 131 kW at any engine speed. The following overload conditions can be accommodated:

Power (kw)	Duration Time	Recurring Time (Hours)
168	5 minutes	1000
168	5 seconds	1
336	5 seconds	1000

V2500-D5						
Drive	Rotation	Gear ratio / HP rotor	Continuous Torque (daN.m)	Static Torque (daN.m)	Overload Torque (daN.m)	Overhung Moment (daN.m)
Engine Starter	CCW	0.941	-	*	-	6.2
Aircraft Electrical Generation	CCW	1.582	**	62.1	**	11.3
Aircraft Hydraulic Generation	CCW	0.275	12.4	53.1	23.7	1.1

CCW = Counter Clock-Wise

* Maximum starter torque = 63.7 daN.m at zero rpm. The maximum allowable starter torque value is 159.3 daN.m.

** Maximum allowable continuous torque values are equivalent to 131 kW at any engine speed. The following overload conditions can be accommodated:

Power (kw)	Duration Time	Recurring Time (Hours)
125	5 minutes	1000
168	5 seconds	1
250	5 seconds	1000

10. Maximum Permissible Air Bleed Extraction

V2500-A5, V2500-E5		
Bleed location	HP rotor corrected speed	Airflow limit (2)
HPC 7th stage	At or Below 90 % of N2K	8.2 % of primary airflow
	From 90 % to 97 % of N2K	Linear variation between 8.2 % and 6 % of primary airflow
	Above 97 % of N2K	6 % of primary airflow
HPC 10th stage (1)	At or Below 61 % of N2K	13.7 % of primary airflow
	From 61 % to 78 % of N2K	Linear variation between 13.7 % and 12 % of primary airflow
	From 78 % to 97 % of N2K	Linear variation between 12 % and 6 % of primary airflow
	Above 97 % of N2K	6 % of primary airflow

(1) - No 10th Stage bleed allowed below 6700 m (22,000 ft) at Maximum 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.

V2500-D5		
Bleed location	HP rotor corrected speed	Airflow limit (2)(3)
HPC 7th stage only	At or Below 100 % of N2K	9.2 % of primary airflow
HPC 10th stage only (1)	From minimum idle to 65 % of N2K	Linear variation between 16 % and 18 % of primary airflow (4)
	From 65 % to 75 % of N2K	Linear variation between 18 % and 16 % of primary airflow
	From 75 % to 84 % of N2K	16 % of primary airflow
	From 84 % to 97.5 % of N2K	Linear variation between 16 % and 7 % of primary airflow
	Above 97.5 % of N2K	7 % of primary airflow
HPC 7th stage mixed bleed	From 79 % to 86.5 % of N2K	Linear variation between 0 % and 9 % of primary airflow
	From 86.5 % to 96 % of N2K	9 % of primary airflow
HPC 10th stage mixed bleed (5)	From 79 % to 84 % of N2K	16 % of primary airflow
	From 84 % to 93.6 % of N2K	Linear variation between 16 % and 4 % of primary airflow
	From 93.6 % to 96 % of N2K	4 % of primary airflow

(1) - Below 7300m (24,000 ft):

- At ambient temperatures above 5°C (40°F), no 10th stage bleed is allowed at Maximum Continuous Rating and above.
- At 5°C (40°F) ambient temperature and below, a maximum of 2% 10th stage bleed is allowed at Take-Off Rating and 4% 10th stage bleed at Maximum 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) - 18% for ambient temperatures of -1°C (30°F) and below only.

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

	Max Combined Bleed Limit (% of primary airflow):
From 79% to 80% N2K	Linear variation between 16% and 16.5%
From 80% to 87.5% N2K	16.5%
From 87.5% to 91% N2K	Linear variation between 16.5% and 12.5%
From 91% to 96% N2K	12.5%

IV. Operating Limitations

1. Temperature Limits

1.1 Exhaust Gas Temperature (°C - Actual / Indicated):

The exhaust gas temperature is measured at station T4.9 (aft of LPT stage 1).

	V2522-A5	V2524-A5	V2527-A5 V2527E-A5 V2527M-A5	V2530-A5	V2533-A5
Take-Off	625 / 635	635 / 635	645 / 635	650 / 650	670 / 650
Maximum Continuous	610 / 610	610 / 610	610 / 610	610 / 610	610 / 610
Starting	635 / 635	635 / 635	635 / 635	635 / 635	635 / 635

	V2525-D5	V2528-D5	V2531-E5	-	-
Take-Off	620 / 620	635 / 635	670 / 670	-	-
Maximum Continuous	610 / 610	610 / 610	610 / 610	-	-
Starting	635 / 635	635 / 635	635 / 635	-	-

This table gives the maximum permissible approved EGT values for individual engine models, although these maximum values may not be implemented on all models. Refer to the applicable engine "Installation and Operating Manual" document for information defining the EGT limit values currently assigned to specific engine models.

The 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.

1.2 Oil Temperature (°C):

At the pressure pump outlet:
Maximum Continuous: + 155
Maximum Transitory (15 minutes): + 165

1.3 Fuel Inlet Temperature (°C):

At engine fuel pump inlet:
Minimum: minus 54
Maximum: + 54

1.4 Engine Equipment Temperatures:

Refer to the applicable engine "Installation and Operating Manual" document.

2. Speed Limits

Maximum rotational speeds:
Low pressure rotor (N1): 5650 (100 %)
High pressure rotor (N2): 14950 (100 %)

Minimum rotational speed for operation during icing conditions:
Low pressure rotor (N1): 1400 (24.8 %)

3. Pressure Limits

3.1 Fuel Pressure

At inlet to engine system pump, not less than 345 hPa above the true vapour pressure of the fuel and not greater than 4826 hPa with a vapour/liquid ratio of zero.

3.2 Oil Pressure

Minimum: 4137 hPa

4. Time Limited Dispatch (TLD)

The engine has been approved for Time Limited Dispatch. The maximum rectification period for each dispatchable state is specified in the applicable engine "Installation and Operating Manual" document, section 4.13 (V2500-A5, V2500-D5) or section 6.13 (V2500-E5) . The technical data substantiating the "Installation and Operating Manual" TLD limits are contained in IAE V2500 Reports IAE-0184, PWA-6564, PWA-6243 and PWA-9834.

5. ETOPS Capability

The engine is not approved for ETOPS capability in accordance with CS-E 1040 (see also Note 11).

V. Operating and Service Instructions

Manuals	V2500-A5	V2500-D5	V2500-E5
Installation and Operating Manual	IAE-0043	IAE-0174	IAE-0287-01
Operating Instructions	OI-V2500-1IA	OI-V2500-3IA	OI-V2500-5IA

Instructions for Continued Airworthiness (ICA)	V2500-A5	V2500-D5	V2500-E5
Time Limits Manual	T-V2500-1IA 2A4408	T-V2500-3IA 2A4417	2A4384
Engine Manual	E-V2500-1IA 2A4407	E-V2500-3IA 2A4416	2A4383
Standard Practices Manual	SPP-V2500-1IA / 2A4414		
Maintenance Manual	M-V2500-1IA	M-V2500-3IA	2A4386
Fault Isolation Manual	(1)	(1)	2A4403
Component Maintenance Manuals	As published by IAE		
Service Bulletins	As published by IAE		

(1) - Fault Isolation Manual is an aircraft document for the V2500-A5 and V2500-D5

VI. Notes

1. The take-off thrust, with the associated limits, shall not be used continuously more than 5 minutes. The duration may be extended to 10 minutes in case of engine failure in multi-engine aircraft. If the duration exceeds 5 minutes, this shall be recorded in the engine log book.

2. The ratings are based on Sea Level Static test stand operation under the following condition:
   - Engine inlet air at 15°C (59°F) and 1013.2 hPa (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.

The Take-Off rating is available at and below the following ambient temperatures:

V2522-A5 V2524-A5	V2527-A5 V2527E-A5 V2527M-A5	V2530-A5 V2533-A5	V2525-D5 V2528-D5	V2531-E5
ISA+40°C	ISA+31°C	ISA+15°C	ISA+15°C	ISA+20°C

The Maximum Continuous rating is available at and below ISA+10°C ambient temperatures.

3. 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.

4. Information regarding transient rotor shaft over-speed rpm, as well as transient gas over-temperature and number of over-temperature occurrences, is specified in the applicable Maintenance Manual document.

5. The EASA approved Airworthiness Limitations Section of the Instructions for Continued Airworthiness is published in the applicable engine "Time Limits Manual" document, chapter 5.

6. Lightning and EMI protection capability of the electronic engine control system, including cables, are specified in the applicable engine “Installation and Operating Manual” document, section 4.12 (V2500-A5, V2500-D5) or section 6.12 (V2500-E5).

7. The maximum permissible engine inlet distortion limit is specified in the applicable engine “Installation and Operating Manual” document.

8. The V2500-A5 model is approved for use with the thrust reverser system identified as Drawing Number 745D8018 – Refer to FAA Supplemental Type Certificate SE1091NE. The V2500-D5 model is approved for use with the thrust reverser system identified as Drawing Number 290-0002. The V2500-E5 model is approved for use with the thrust reverser system identified as Drawing Number 750-0002.

9. EASA Type Certificate (TC) and Type Certificate Data Sheet (TCDS) N° E.069 is established on the basis of DGAC-France TC and TCDS N° M-IM31. EASA TC and TCDS N° E.069 replaces all TC and TCDS previously issued in the EASA countries.

10. Per EASA Certificate 10031023 dated 22 July 2010, the engine models V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5 produced after serial number S/N V15002 (included) were

recertified to show compliance with the NOx Standards defined in ICAO Annex 16, Volume II, Part III, Chapter 2, paragraph 2.3.2 d (CAEP/6 NOx production rule).
Per EASA Certificate 10072011 dated 12 December 2019, the engine models V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5 produced after serial number S/N V15002 (included) were recertified to show compliance with Part III, Chapter 4, paragraph 4.2.2 (CAEP/10) of ICAO Annex 16 Volume II, Amendment 9 (1st January 2018) as implemented into EU legislation 11/09/2018.

11. Although the engine is not approved for ETOPS capability in accordance with CS-E 1040, the aircraft type the engine is installed on may have been approved for ETOPS.

SECTION: ADMINISTRATIVE

I. Acronyms and Abbreviations

n/a

II. Type Certificate Holder Record

n/a

III. Change Record

TCDS Issue	Date	Changes	TC Issue Date
Issue 01	23 July 2010	Initial issue for models V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5, V2525-D5, V2528-D5 established on the basis of DGAC-France TC and TCDS N° M-IM31.	Initial Issue, 23 July 2010
Issue 02	25 January 2013	Emission requirement compliance of the V2500-A5 produced after serial number S/N V15002 (included) (certificate 10031023) – See note 10	23 July 2010
Issue 03	20 June 2017	EU Commission Regulation 1702/2003 is replaced by Regulation No 748/2012. Addition of the V2531-E5 engine model.	Amended, 20 June 2017
Issue 04	12 December 2019	1. Update of emission requirement compliance (certificate 10072011) – See note 10 2. Addition of a note with respect to an eventual ETOPS approval at aircraft level	20 June 2017

-END-