

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

TYPE CERTIFICATE DATA SHEET Nº EM-2003T03

Type Certificate Holder:

General Electric Aircraft Engines (GE)

1000 Western Avenue
Lynn, Massachusetts - 01910

USA

EM-2003T03
Sheet 01
GENERAL ELECTRIC
COMPANY
CF34-8E2; CF34-8E2A1;
CF34-8E5; CF34-8E5A1;
CF34-8E5A2; CF34-8E6;
CF34-8E6A1
June 2003

Engines of models described herein conforming to this data sheet, which is part of Type Certificate No.2003T03, 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.

MODEL CF34-8E2; CF34-8E2A1; CF34-8E5; CF34-8E5A1; CF34-8E5A2; CF34-8E6; CF34-8E6A1

TYPE Dual rotor, axial flow, high bypass ratio turbofan; single stage fan, ten stage axial compressor, annular combustion chamber, two stage high pressure turbine, four stage low pressure turbine, a thrust reverser, aft core cowl, exhaust nozzle, starter, and a Full Authority Digital Engine Control (FADEC).

RATINGS	Sea level static thrust, daN (lb)	CF34-8E2	CF34-8E2A1	CF34-8E5	CF34-8E5A1	CF34-8E5A2	CF34-8E6	CF34-8E6A1
See Note 1	Maximum takeoff (5 min.)	5 916	5 916	6 454	6 454	6 454	6 250	6 250
	(See Notes 14, 15 and 18)	(13 300)	(13 300)	(14 510)	(14 510)	(14 510)	(14 050)	(14 050)

RATINGS (Cont.)	CF34-8E2	CF34-8E2A1	CF34-8E5	CF34-8E5A1	CF34-8E5A2	CF34-8E6	CF34-8E6A1
Normal takeoff (5 min.) (See Notes 14 and 15)	5 520 (12 410)	5 916 (13 300)	5 970 (13 420)	6 250 (14 050)	6 544 (14 510)	5 970 (13 420)	6 250 (14 050)
Maximum continuous (See Notes 14)	5 578 (12 540)	5 578 (12 540)	6 014 (13 520)	6 014 (13 520)	6 014 (13 520)	6 014 (13 520)	6 014 (13 520)

ENGINE CONTROL SYSTEM CF34-8E2; CF34-8E2A1; CF34-8E5; CF34-8E5A1; CF34-8E5A2; CF34-8E6; CF34-8E6A1

Fuel Control, Woodward Governor 4120T01

Full Authority Digital Engine
Control (FADEC), BAE Systems 4120T00

Ignition System
2 Ignition Exciters, Unison 9238M66
2 Ignition Plugs, Federal Mogul/ Champion 4096T33

Fuel Pump, Argotech 4120T04

FUEL TYPE Fuel conforming to GE Jet Fuel Specification No. D50TF2, current revision, is applicable for all models. See GEK 112034, Operating Instructions, for specific fuels approved per the subject specifications.

OIL LUBRICATION Oil conforming to GE Specification No. D50TF1, current revision, is applicable for all models. See GEK 112034, Operating Instructions, for specific oils approved per the subject specifications.

TEMPERATURE LIMITS See Note 2.

**PRESSURE
LIMITS**

See Note 5.

**PRINCIPLE
DIMENSIONS AND
MEASUREMENTS**CF34-8E2; CF34-8E2A1; CF34-8E5; CF34-8E5A1; CF34-8E5A2; CF34-8E6; CF34-8E6A1
(RBHA/FAR 33 Propulsion System; see Installation Manual GEK 112033)

Length, cm (inches)	
Maximum diameter, cm (inches)	308 (121.18)
Weight, kg (pounds)	159.2 (62.65)
(includes residual fuel and oil)	
Center of Gravity Location, cm (inches)	1 428 (3 147.6)
Engine Station	444.5 (175.01)
Butt Line	252.6 (99.43)
Water Line	254.2 (100.07)

AIR BLEED

See Note 10

**IMPORT
REQUIREMENTS**

Each engine imported separately and/or spare parts must be accompanied by an Airworthiness Certificate for Export and/or an Airworthiness Approval Tag, respectively, issued by FAA (or a third country authority, in case of used engine imported from such country) attesting that the particular engine and/or parts were submitted to the governmental quality control before delivery and are in conformity with the CTA approved type design. The CTA type design corresponds to the FAA approved type design, as stated in CTA Report V.33-0456-02 dated 15 June 2003 or further revisions.

**CERTIFICATION
BASIS**

1. RBHA 33 corresponding to Federal Aviation Regulations (FAR) Part 33, including Amendments 33-1 through 33-20 effective 26 March 1998.
2. RBHA 34 corresponding to Federal Aviation Regulations (FAR) Part 34, Amendment 3 effective 03 February 1999.
3. ICAO Emissions Standards, Annex 16, Volume 2, Part 3, Chapter 2, Second Edition 1993.

FAA Type Certificate No. E00063EN; CTA Type Certificate No. 2003T03.

<u>Model</u>	<u>Date of Application</u>	<u>Issued/Amended</u>	<u>Model</u>	<u>Date of Application</u>	<u>Issued/Amended</u>
CF34-8E2	02 August 2000	15 May 2003	CF34-8E5A2	02 August 2000	15 May 2003
CF34-8E2A1	11 January 2002	15 May 2003	CF34-8E6	02 August 2000	15 May 2003
CF34-8E5	02 August 2000	15 May 2003	CF34-8E6A1	11 January 2002	15 May 2003
CF34-8E5A1	02 August 2000	15 May 2003			

NOTE 2: *The interturbine temperature is measured by 5 probes (10 thermocouples) mounted in the low-pressure turbine casing.
(Cont.)

**The 2-minute interturbine temperature (T4.5) limits (2 minutes out of 5 minutes takeoff time) are intended to cover engine T4.5 overshoot characteristics that occur during engine stabilization at constant Takeoff thrust.

Refer to GE Engine Manual GEK 112031 for inspection requirements when limits are exceeded.

For CF34-8E2; CF34-8E2A1; CF34-8E5; CF34-8E5A1; CF34-8E5A2; CF34-8E6; CF34-8E6A1:

Oil tank temperatures***, °C (°F):

Continuous operation	155 (311)
Transient operation	163 (325)

***Transient operation above 155°C (311°F) is limited to 15 minutes.

Fuel inlet temperature (at engine fuel filter inlet), °C (°F):

Continuous operation	
Jet A, Jet A1, Jet B	121 (250)
JP8	121 (250)
JP5	121 (250)
JP4, JP4/JP5 mixture	121 (250)
Ground operation	121 (250)

NOTE 3: Maximum permissible engine operating speeds for the engine rotors are as follows:
CF34-8E2; CF34-8E2A1; CF34-8E5; CF34-8E5A1; CF34-8E5A2; CF34-8E6; CF34-8E6A1

Low pressure rotor (N1), rpm		High pressure rotor (N2), rpm	
Maximum takeoff	7 360	Maximum takeoff	17 710
Normal takeoff	7 360	Normal takeoff	17 710
Maximum continuous	7 360	Maximum continuous	17 470

Refer to GEK 112031 and other manual or inspection requirements when limits are exceeded.
100 percent N1 rotor speed is 7 400 rpm, 100 percent N2 rotor speed is 17 820 rpm.

NOTE 4: The maximum permissible inlet distortion for these engines is specified in GE Installation Manual GEK 112033.

NOTE 5: Fuel and Oil Pressure Limits

Fuel: At engine pump inlet: minimum differential pressure of 34.5 kPa (5 psid) above the true vapor pressure of the fuel with a vapor/liquid ratio of zero with aircraft boost operative. Operating range 34.5 kPa (5 psig) to 344.7 kPa (50 psig). At engine motive flow discharge: minimum gauge pressure of 1 034.2 kPa (150 psig) at idle or above. Operating range is 1 034.2 kPa (150 psig) to 5 515.8 kPa (800 psig). See GE Installation Manual GEK 112033 for additional limits.

Oil: At idle on the ground, 172.4 kPa (25 psid) minimum to 413.7 kPa (60 psid) maximum. At takeoff, 310.3 kPa (45 psid) minimum to 655.0 kPa (95 psid) maximum. Operating range, 172.4 kPa(25 psid) to 655.0 kPa (95 psid). See GE Installation Manual GEK 112033 for additional limits.

NOTE 6: Accessory Drive Provisions

Accessory	Location on AGB Axis	Speed (rpm)	Horsepower Rating kW (hp)	Direction of Rotation facing AGB	Torque (lbf-in) Static / Cont / Overload	Max. Acc. Wt. N (lb)	Overhung Moment N.m (lb-in)	Shear Torque N.m (lb-in)
Lube/Scav Oil Pump	Axis-C Fwd	7 898	4.5 (6)	CCW	300 / 48 / NA [1]	45.8 (10.3)	3.7 (33)	84.7 – 96.00 (750-850)
IDG	Axis-C Aft	7 898	55.8 (74.8) [2]	CW	675 [1] / 597 / 1 129 (5 min) [4] / 1 605 (5 sec) [4]	361.2 (81.2) [6]	81.3 (720) Maximum	355.2 - 412.2 (3 144 – 3 648)
Air Turbine Starter	Axis-D Aft	12 234	N/A	CW	2 112, 4 200 [3] / NA / NA	123.2 (27.7)	12.8 (113)	711.8 - 847.4 (6 300 – 7 500)
Hydraulic Pump	Axis-G Fwd	4 825	22.4 (30)	CW	573 [1] [5] / 392 / 670	61.8 (13.9) Dry	4.3 (38.4)	226.4 (2004) Maximum
Alternator	Axis-E Aft	8 103	3.0 (4)	CCW	NA / NA / NA	13.3 (3.0)	0.3 (2.6)	N/A
Fuel Pump	Axis-F Aft	8 319	30.0 (40)	CW	180 [1] / 303 / NA	102.3 (23)	12.8 (113)	138.4 – 155.9 (1 255 – 1 380)

NOTE 6: CW – Clockwise CCW – Counter Clockwise
(Cont.)

Accessory Speeds are based on Core Speed: 17000 rpm

[1] -40° C (-40° F) SLS

[2] Horsepower is constant over the operating range with slight variations due to changes in efficiency. Horsepower extraction is 55.8 kW (74.8 hp) at 7 898 rpm (pad speed) and 54.8 kW (73.5) hp at 4618 rpm (pad speed). The 5-minute overload rating is 61.7 kW (82.7 hp) and the 5-second overload rating is 87.7 kW (117.6 hp).

[3] 238.62 N.m (2 112 in-lbs) at 15° C (59° F) SLS, 4200 in-lbs at -40° C (-40° F) SLS

[4] Overload at 4 618 rpm (pad speed)

[5] 64.74 N.m (573 in-lbs) at 626 rpm (pad speed)

[6] Includes oil and V band coupling

NOTE 7: CF34-8E2 Derivative of CF34-8C1; top mounted; increased T45; includes thrust reverser and aft core cowl
CF34-8E2A1 Derivative of CF34-8C1; top mounted; increased T45; includes thrust reverser and aft core cowl
CF34-8E5 Derivative of CF34-8C1; top mounted; increased T45 and thrust rating; includes thrust reverser and aft core cowl
CF34-8E5A1 Derivative of CF34-8C1; top mounted; increased T45 and thrust rating; includes thrust reverser and aft core cowl
CF34-8E5A2 Derivative of CF34-8C1; top mounted; increased T45 and thrust rating; includes thrust reverser and aft core cowl
CF34-8E6 Derivative of CF34-8C1; top mounted; increased T45 and thrust rating; includes thrust reverser and aft core cowl
CF34-8E6A1 Derivative of CF34-8C1; top mounted; increased T45 and thrust rating; includes thrust reverser and aft core cowl

NOTE 8: Life limits, established for critical components, are published in FAA approved GE Engine Manual GEK 112031 .

NOTE 9: For the CF34-8E engine models, the engine manufacturer supplies the nacelle system. The following aft core cowl and thrust reverser systems, which are a part of this nacelle system, have been certified for the listed engine models under this type certificate in accordance with RBHA/ FAR 33. The RBHA/FAR 33 engine type design definition is provided by:

ENGINE MODEL LIST

AFT CORE COWL PARTS LIST

THRUST REVERSER PARTS LIST

CF34-8E2	15F0001	15G0001
CF34-8E2A1	15F0001	15G0001
CF34-8E5	15F0001	15G0001
CF34-8E5A1	15F0001	15G0001
CF34-8E5A2	15F0001	15G0001
CF34-8E6	15F0001	15G0001

CF34-8E6A1

15F0001

15G0001

NOTE 10: Air Bleed Extraction - maximum customer air bleed extraction is as follows: Customer bleed air is available from either stages 6 or 10 (compressor discharge) of the compressor at all operating conditions at or above idle. (No compressor bleed is permitted below idle.). Customer bleed is scheduled to switch from stage 10 bleed at low power operation to stage 6 bleed at high power operation as described in GE Installation Manual GEK 112033.

<u>Location</u>	<u>Maximum Demonstrated Bleed Air</u> <u>(% of Total Compressor Airflow)</u>
Compressor Stage 6	8.0
Compressor Stage 10 (Compressor Discharge)	12.0
Maximum Allowable Bleed	12.0

NOTE 11: Recommended maintenance inspection intervals are published in GE Engine Manual GEK 112031.

NOTE 12: The operating temperature limit for specific components and accessories specified in GE Installation Manual GEK 112033 must be observed when installing the engine.

NOTE 13: A minimum core speed (N2) must be maintained to ensure engine operation in icing conditions. The FADEC power management controls ground and flight idle core speeds above the minimum speed demonstrated for RBHA/FAR 33.68, Induction System Icing. At low ambient temperatures, the minimum permissible ground and flight idle speeds correspond to N2=58.47% (9 940 rpm) that is a non-adjustable limit, preset in the FADEC power management schedules. As ambient temperatures increase, the minimum permissible core speed increases as scheduled by the FADEC power management based upon N2 or PS3 control schedules.

NOTE 14: For CF34-8E engine models, static thrusts at sea level are rated at 30°C (86°F) ambient temperature and below for normal takeoff and maximum takeoff. Maximum continuous thrust is rated 25°C (77°F) and below at cruise altitudes. The computer performance decks for calculating engine performance are as follows:

Engine Models

CF34-8E2; CF34-8E2A1; CF34-8E5; CF34-8E5A1; CF34-8E5A2; CF34-8E6; CF34-8E6A1

Computer Deck No.

G0175D

NOTE 15: The time limit at the normal takeoff rating is five minutes and shall include any time accumulated above the normal takeoff rating.

NOTE 16: Time Limited Dispatch Criteria

Criteria pertaining to the dispatch and maintenance requirements for the engine control systems are specified in the airworthiness section of the GE Engine Manual GEK 112031, which defines the various configurations and maximum operating intervals.

NOTE 17: Overhaul of the CF34-8E engine models' components is only authorized via approved component manuals.

NOTE 18: The 5-minute maximum takeoff time limit may be extended to 10 minutes for one engine inoperative operation in multi-engine aircraft.

NOTE 19: Refer to Operating Instructions GEK 112034 for engine warm-up procedure.

NOTE 20: Refer to Operating Instructions GEK 112034 for thrust reverser operation.

NOTE 21: The CF34-8E engine models' normal takeoff interturbine temperature (T45) limit has been established to assure that a fully degraded engine at the normal takeoff rating will achieve the maximum takeoff rated thrust without exceeding the maximum takeoff T45 limit.

NOTE 22: CF34-8E engines (all models) comply with the applicable fuel venting and exhaust emission requirements of RBHA/FAR 34, Amendment 3, effective 03 February 1999.

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