



TYPE CERTIFICATE DATA SHEET Nº EM-2019T01

Type Certificate Holder:

GENERAL ELECTRIC COMPANY

GE Aviation

1 Neumann Way

Cincinnati, OH 45215-6310

United States of America

EM-2019T01-00

SHEET 01

GENERAL ELECTRIC COMPANY

GE Passport 20-17BB1A,
GE Passport 20-18BB1A,
GE Passport 20-19BB1A.

10 DECEMBER 2019

Engines of models described herein conforming with this data sheet, which is part of Type Certificate No. 2019T01, 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.

TYPE The GE Passport 20 engine is a high bypass dual-rotor, axial-flow turbofan. The bypass ratio of the engine is 5.6:1 with an overall pressure ratio of 45:1. The high pressure compressor (HPC) pressure ratio is 23:1. The High pressure compressor (HPC) is driven by a two stage High pressure turbine (HPT). The 10-stage high-pressure (HP) compressor includes five blisk stages for weight reduction. The integrated front fan and three stage Low pressure compressor (LPC) is driven by a four stage Low pressure turbine (LPT). A Low Emission combustor (LEC) is used for weight and emissions advantage. Combustor case has integrated OGV diffuser for weight reduction. The accessory drive system extracts energy from the high pressure, high speed rotor to drive the engine accessories and the engine-mounted aircraft accessories. The engine is equipped with a dual channel Next Gen Full-Authority Digital Engine Control (FADEC) control system which provides enhanced fault isolation and capability for engine functionality and diagnostics.

RATINGS (See Note 1)

MODELS GE Passport 20-17BB1A, GE Passport 20-18BB1A, GE Passport 20-19BB1A.

Static Thrust, at sea level, kN (lbf)	GE Passport 20-17BB1A	GE Passport 20-18BB1A	GE Passport 20-19BB1A
- Maximum Continuous	74.8 (16,815)	78.1 (17,565)	78.1 (17,565)
Fan speed (rpm)	5,517	5,611	5,611
- Takeoff - 5 min. (See Note 13.3)	78.9 (17,745)	82.0 (18,435)	84.2 (18,920)
Fan speed (rpm)	5,633	5,706	5,761
Flat Rating Ambient Temp., °C (°F)			
- Takeoff - 5 min	35 (95)	35 (95)	30 (86)
- Maximum Continuous – static	25 (77)	25 (77)	25 (77)

ENGINE MODELS CONFIGURATION	GE Passport 20- 17BB1AG01/G02	GE Passport 20- 18BB1AG01/G02	GE Passport 20- 19BB1AG01/G02
	GE Passport 20- 17BB1AG03/G04	GE Passport 20- 18BB1AG03/G04	GE Passport 20- 19BB1AG03/G04

COMPONENTS (GE P/N)

	GE Passport 20-17BB1A	GE Passport 20-18BB1A	GE Passport 20-19BB1A
Fuel Metering Unit	2496M14	2496M14	2496M14
Electronic Engine Control	2500M36	2500M36	2500M36
Pressure Sub-system	2474M65	2474M65	2474M65
FADEC Software (earliest part number shown)	2575M73	2575M73	2575M73
Data Entry Plug	2531M61	2531M61	2531M61
Fuel Pump	2496M12	2496M12	2496M12

IGNITION SYSTEM

Two ignition exciters GE P/N	2488M61	2488M61	2488M61
Two igniter plugs GE P/N	2519M29	2519M29	2519M29

PRINCIPAL DIMENSIONS mm (in)

Length (Fan spinner to aft centerbody flange)	3366 (132.50)	3366 (132.50)	3366 (132.50)
Width (maximum envelope)	1380 (54.32)	1380 (54.32)	1380 (54.32)
Height (maximum envelope)	1318 (51.90)	1318 (51.90)	1318 (51.90)

**WEIGHT (DRY)
kg (lbs)**

Includes basic engine, basic engine accessories, and optional equipment as listed in the manufacturer's engine specifications.

2065.7 (4554)	2065.7 (4554)	2065.7 (4554)
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CENTER OF GRAVITY LOCATIONS mm (in); Engine only

	GE Passport 20-17BB1A	GE Passport 20-18BB1A	GE Passport 20-19BB1A
Station (axial) – LH Engine	5525 (217.5)	5525 (217.5)	5525 (217.5)
Waterline – LH Engine	2466 (97.1)	2466 (97.1)	2466 (97.1)
Buttline – LH Engine	2560 (100.8)	2560 (100.8)	2560 (100.8)
Station (axial) – RH Engine	5532 (217.8)	5532 (217.8)	5532 (217.8)
Waterline – RH Engine	2466 (97.1)	2466 (97.1)	2466 (97.1)
Buttline – RH Engine	2510 (98.8)	2510 (98.8)	2510 (98.8)

FUEL TYPE See NOTE 12.1 for approved fuels.

OIL TYPE See NOTE 12.2 for approved lubricants.

REFERENCE PRESSURE RATIO The ratio of the mean total pressure at the last compressor discharge plane of the compressor to the mean total pressure at the compressor entry plane when the engine is developing take-off thrust rating in ISA sea level static conditions. 45

TEMPERATURE LIMITS For engine indicated turbine gas temperature limits, see Note 2.

PRESSURE LIMITS For fuel and oil pressure limits, see Note 3.

ROTOR SPEEDS For engine rotational speed limits, see Note 19.

AIR BLEED For maximum permissible air bleed extraction, see Note 21

**IMPORT
REQUIREMENTS**

Each engine imported separately, and/or spare parts, must be accompanied by a FAA Export Airworthiness Approval through the FAA Form 8130-3, Authorized Release Certificate, certifying that the engine is in compliance with the ANAC approved Type Design, defined by the Brazilian Type Certificate Data Sheet No. EM-2019T01, last revision, is in condition for safe operation and has undergone a final operational check. The original Authorized Released Certificate should be sent with the engine and a copy remains with the issuing organization.

For each engine it is required a list of exceptions (if any) in respect to the ANAC approved Type Design, listed in the FAA Authorized Release Certificate above mentioned. The ANAC approved type design corresponds to the FAA approved type design.

CERTIFICATION BASIS

Brazilian Type Certificate No. 2019T01 issued on 10DEC2019 is based on RBAC 21.29 including the following requirements:

Airworthiness Standards

- RBAC 33 (Requisitos de aeronavegabilidade: motores aeronáuticos), Amendment 28; which corresponds to 14 CFR Part 33, effective 01 February 1965, as amended by 33-1 through 33-28, inclusive. Additionally, based on RBAC 21.29(a)(1)(ii) the following requirements are applicable: 14 CFR Part 33, as amended by 33-29 through 33-33; with the following Equivalent Level of Safety (ELOS) findings, raised by FAA:

- ELOS No. TC3323EN-E-P-10 for §33.76, which corresponds to 14 CFR 33.76, Bird Ingestion Test Compliance by Engineering & Analysis;
- ELOS No. TC3323EN-E-P-9 for §33.83, which corresponds to 14 CFR 33.83, Vibration Test Compliance by Similarity & Analysis and
- ELOS No. TC3323EN-E-P-13 for §33.89, which corresponds to 14 CFR 33.89, Operation Test, Thrust Response.

Emissions Standards:

- RBAC 34 (Requisitos para drenagem de combustível e emissões de escapamento de aviões com motores a turbina, Amendement 06; corresponding to 14 CFR Part 34, effective 23 October 2013, amendment 5A, inclusive (see Note 11 for further information about certification basis for fuel venting and exhaust emissions);
- ICAO Annex 16, Vol. II, third edition, July 2008, including Amendment 7, effective 30AUG2011, as applicable to turbofan engines. NOx emission's limits standards in accordance with Part III, Chapter 2, Section 2.3.2.e (CAEP/8).

<u>Model</u>	<u>Application</u>	<u>Issued TC/Amended</u>
GE Passport 20-17BB1A	06NOV2018	10DEC2019
GE Passport 20-18BB1A	06NOV2018	10DEC2019
GE Passport 20-19BB1A	06NOV2018	10DEC2019

PRODUCTION BASIS Production Certificate No. 108.

NOTES

NOTE 1

ENGINE RATINGS

Engine ratings are based on a calibrated test stand, under the conditions specified below)

1. Sea level static, standard pressure (14.696 psia), 59 °F.
2. No customer bleed or customer power extraction.
3. Ideal engine Inlet, 100 % ram recovery
4. Production aircraft cowling.
5. Production instrumentation.
6. Fuel lower heating value of 18,400 BTU/lb.

NOTE 2

TEMPERATURE LIMITS:**- Maximum Indicated Turbine exhaust gas temperature (T49) °C (°F):**

Takeoff - 5 minutes (see NOTE 13.3)	1035 (1895)
Maximum continuous:	995 (1823)
Ground starts (manual or auto)	750 (1382)
Inflight Starts (manual or auto)	875 (1607)
Inflight Starts (high power fuel cut)	975 (1787)

Twenty (20) Exhaust Gas Temperature excursions of up to 1077°C (1970.6 °F) for up to 15 seconds permitted before maintenance action required. Operator needs to maintain the count of excursions.

- Oil Temperature Limits, °C (°F):

Maximum	
Continuous Operation	160 (320)
Transient (15 minutes)	165 (329)

NOTE 3

FUEL AND OIL PRESSURE LIMITS:

Fuel Pressure Limits at the Engine Pump Inlet

1. Aircraft Boost Pump Operative

The minimum pressure at the engine fuel pump inlet with aircraft boost pumps operative is true vapour pressure plus 5 psia (32.4 kPa) with aircraft boost pump operative to a maximum of 50 psia. The maximum vapour to liquid ratio at the engine fuel pump inlet with aircraft boost pumps operative is zero.

**NOTE 3
CONT...**

2. Aircraft Boost Pump Inoperative

The engine fuel system operation is restricted with the aircraft boost pumps inoperative as outlined in the GE Passport 20 Installation Manual GEK 112054.

Oil Pressure Limits:

See Figure 8.2.6 of the GE Passport 20 Specific Operating Instructions GEK 112053 for definition of minimum and maximum oil pressures

NOTE 4**ACCESSORY DRIVE CHARACTERISTICS**

Accessory	Rotation (Note 1)	Gear Ratio to Core Rotor	Drive Shaft (rpm)	Maximum Weight kg (lb)	Maximum Overhung Moment N.m (in.lb)	Shear Torque N.m (in.lb)	Cont. Pad Rating kW (HP)	Over-Load kW (HP)
VFG	CW	0.8523	16773	41.27 (91.20) Wet	59.77 (529) Wet	474.54 (4200.0)	76.1 (102.1)	89.5 (120) For 2 min. (See Note 3)
Air Turbine Starter	CW	0.5714	11246	9.50 (21) Dry	6.40 (56.7) Dry	847.38 (7500)	N/A	N/A
Fuel Pump	CW	0.3844	7565	13.08 (28.90) Dry	13.39 (118.5) Dry	342.34 (3030)	63.0 (84.5)	N/A
PMA	CW	0.9143	17993	2.73 (6.01) Dry	0.62 (5.5)	N/A	0.52 (0.70)	N/A
PMG	CCW	0.9143	17993	1.49 (3.3) Dry	0.75 (6.6) Dry	N/A	0.82 (1.1)	N/A
Lube Unit	CW	0.2406	4734	12.08 (26.71) Wet	13.55 (119.9)	192.52 (1704)	3.58 (4.8)	N/A
Hydraulic Pump	CCW	0.2406	4734	9.23 (20.4) Dry	10.53 (93.23) Dry	305.06 (2700)	19.2 (25.8) at idle speed 33.6 (45) at max speed	29.7 (39.8) at idle speed 51.8 (69.4) at max speed
Core Turn Cranking Pad	CW (3)	0.3466	6821	N/A	N/A	N/A	N/A	N/A

"--" Same as previous model; "#" Not applicable

**NOTE 4
CONT...**

Notes:

1. Rotation is defined facing the pad.
2. 100 percent core engine speed is 19680 rpm.
3. VFG Overload ratings: 172 HP at flight idle, 5 sec and 81.5 HP at flight idle, for up to 5 minutes

NOTE 5

MODEL DESCRIPTION (*List differences, similarities and special characteristics for each model, relative to the base model*)
The GE Passport 20 engine models are limited to installation on the Bombardier Aerospace Global-7500 and Global-8000 model aircrafts only with respect to the installed power response characteristics. Any bill-of-material changes that could significantly and adversely affect power response will have to be reassessed.

NOTE 6

ENGINE TYPE DESIGN ACCESSORIES, COMPONENTS, SYSTEM ASSEMBLIES WITH AIRCRAFT LEVEL REQUIREMENTS (*List accessories, similarities and system assemblies that are provided as part of the engine type design, but have traditionally been approved at the installation level and that may have specific aircraft level requirements to meet.*)

The following are installed on the GE Passport 20 engine and have Aircraft Level requirements:

1. Fire Detector, Fan Cowl - GE part no. 2580M13P01 / 2580M13P02
2. Fire Detector, Accessory Gear Box - GE part no. 2516M97P01
3. Fire Detector, Low Pressure Turbine Sensor – GE part no. 2516M98P01

NOTE 7

COMPATIBLE ACCESSORIES, COMPONENTS, SYSTEM ASSEMBLIES UNDER CURRENT ENGINE CERTIFICATION (*List accessories, similarities and system assemblies that are not part of the engine type design, but have been shown to be compatible with the engine model under its certification basis.*)

The GE Passport 20 engine models have the following installation:

1. Thrust Reverser, LH –
2. Thrust Reverser, RH –
3. PreCooler System
4. Engine Driven Hydraulic Pump
5. Variable Frequency Generator
6. Permanent Magnetic Generator
7. Air Management System
 - a. Bleed Pressure Sensor
 - b. Bleed Monitoring Pressure Sensor
 - c. Pressure Regulating Shut off valve
 - d. Fan Air Valve

NOTE 8 **SPECIAL ANTI-ICING OR DE-ICING REQUIREMENTS** (*List accessories, similarities and system assemblies that are provided as part of the engine type design, but have traditionally been approved at the installation level and that may have specific aircraft level requirements to meet.*)

Reserved

NOTE 9 **ENGINE MOUNT SYSTEM PROVISIONS** (*List accessories, similarities and system assemblies that are provided as part of the engine type design, but have traditionally been approved at the installation level and that may have specific aircraft level requirements to meet.*)

The GE Passport 20 engine models contains the following engine mount system parts that need to meet Aircraft level requirements:

1. Yoke - Forward and Aft
2. Link - Forward and Aft
3. Pin, Pylon
4. Bolt, Shoulder Link – Forward and Aft
5. Thrust Link
6. Bolt, Shoulder Thrust Link
7. Pin, Pylon Thrust Link

NOTE 10 **POWER BOOST, INJECTION OR AUGMENTATION SYSTEMS.**
Not Applicable

NOTE 11 **SPECIAL INSTALLATION REQUIREMENTS**

1. Inlet Foreign object protection Not Applicable
2. Electromagnetic Interference (EMI): none
3. Thrust Reverser Installation: None
4. Icing Protection: None
5. Criticality level of software: NA
6. Inlet Foreign object protection Not Applicable
7. Electromagnetic Interference (EMI): none
8. Thrust Reverser Installation: None
9. Icing Protection: None
10. Criticality level of software: NA

**NOTE 11 SPECIAL INSTALLATION REQUIREMENTS
CONT...**

11. Part 34 Emission standards:

The following emissions standards promulgated in RBAC 34, amendment 06, which corresponds to 14 CFR Part 34, Amendment 5A, effective October 23, 2013, have been complied with for the GE Passport 20 engine models.

- Fuel Venting Emission Standards: RBAC 34.10(a) and 34.11, which correspond to 14 CFR 34.10(a) and 34.11;
- Smoke Number (SN) Emission Standards: RBAC 34.21(e)(2), which corresponds to 14 CFR 34.21 (e)(2);
- Carbon Monoxide (CO) Emission Standards: RBAC 34.21(d)(1)(ii), which corresponds to 14 CFR 34.21(d)(1)(ii);
- Hydrocarbons (HC) Emission Standards: RBAC 34.21(d)(1)(i), which corresponds to 14 CFR 34.21(d)(1)(i);
- Oxides of Nitrogen (NO_x) Emission Standards: RBAC 34.23(b)(1), which corresponds to 14 CFR 34.23(b)(1);

The engine manufacturer has declared that the ICAO emissions standards identified in Annex 16, Volume II, Third Edition, Part III, Chapter 2, Section 2.2.2 for SN, Section 2.3.2 for CO and HC, Section 2.3.2.e.2(ii) for NO_x (also known as CAEP/8), and Part II Chapter 2 for fuel venting have also been demonstrated.

12. ETOPS eligibility: GE Passport 20 models have not been certified to ETOPS requirement and therefore are not eligible for ETOPS operations
13. Time Limited dispatch limitations: Criteria pertaining to the engine control systems' dispatch and maintenance requirements have been specified in GEK 119289 FADEC Control System Time Limited Dispatch Summary Document and Chapter 5 Airworthiness Limitation section of the GEK 112062 Line Maintenance Manual. These documents define the various configurations and maximum operating intervals.
14. Exhaust Gas Temperature shunting: The GE Passport 20-17BB1A model incorporates an EGT shunt of 31° C at fan speeds above idle. Thus, for an indicated EGT of 1035° C (1895° F), the measured EGT is 1004° C (1839.2° F).
15. Specific Aircraft Installation eligibility: None

NOTE 12 MANUFACTURER'S SERVICE BULLETINS

1. Refer to GE Passport 20 Service Bulletin SB73-0001 for detailed information pertaining to fuels and additives. This Service Bulletin covers the eligible fuels listed per GE Aviation Specification D50TF2. Eligible fuel classifications are:
 - Class A – Aviation Kerosene
 - Class C – Low Freeze Kerosene
 - Class D – High Flash Kerosene
 - Class E – Low Flash Kerosene

NOTE: Class B – (Jet B, JP4) is prohibited

- NOTE 12 CONT..**
2. Refer to GE Passport 20 Service Bulletin SB79-0001 and its latest revision for detailed information pertaining to Lubricant brands and additives. This Service Bulletin covers the approved oils listed per latest authorised revision of GE Aviation Specification D50TF1. Eligible oil classifications are:
Class A, Class B, Class C, Class E, Class F and Class G
 3. Refer to GE Passport 20 Service Bulletin SB73-0002 and its latest revision for the detailed information pertaining to the minimum approved FADEC software version that needs to be installed.

NOTE 13 SPECIAL OPERATING PROCEDURE OR LIMITATIONS

1. For operating in Icing conditions, requirements, limitation and notes are specified in the latest version of the FAA approved GEK 112053 GE Passport Specific Operating Instructions.
2. It is permissible to operate below minimum oil pressure for a maximum of 20 seconds during negative G operations. Refer GEK 112053 GE Passport 20 Operating Instructions for a definition of minimum oil pressure.
3. Takeoff Limit: The normal 5-minute take off limit may be extended to 10 minutes for one engine operative condition contingency.

NOTE 14 SPECIAL REPAIR AND OVERHAUL INSTRUCTIONS
Reserved

NOTE 15 APPLICABLE MANUALS

1. Applicable Installation information and Limitations have been provided in the latest FAA approved GEK 112054 GE Passport 20 Installation Manual.
2. Refer to the latest version of the FAA approved GEK 112063 Engine Shop Manual and GEK 112062 Line Maintenance Manual for maintenance criteria and requirements.

NOTE 16 IMPORT REQUIREMENTS FOR FOREIGN MANUFACTURED ENGINES
See IMPORT REQUIREMENTS in the main text body.

NOTE 17 LIFE LIMITS

Life Limits for critical rotating components for the GE Passport 20 engine models have been published in the Chapter 5 of the latest FAA approved GEK 112062 Line Maintenance Manual.

NOTE 18 **MILITARY MODEL INFORMATION** (*difference from civil aviation model*).
Reserved

NOTE 19 **MAXIMUM PERMISSIBLE MAIN ROTOR AND OUTPUT SHAFT SPEEDS.**
100 % N1 speed is 6,032.4 rpm.
100 % N2 speed is 19,680.1 rpm.
Maximum permitted Fan Shaft Speed is 6,260 rpm, i.e. 103.7 % of N1
Maximum permitted Core Shaft Speed is 22,625 rpm., i.e. 114.9 % of N2.

NOTE 20 **MAXIMUM ALLOWABLE OUTPUT/PROPELLER SHAFT TORQUE LIMIT AT TORQUE METER/SENSOR**
Not Applicable.

NOTE 21 **MAXIMUM PERMISSIBLE BLEED AIR EXTRACTION**

Stage 4		Stage 7		Stage 10	
PS3 kPa (psig)	Percent W25	PS3 kPa (psig)	Percent W25	PS3 kPa (psig)	Percent W25
0 (0)	5.00	0 (0)	2.40	0 (0)	10.00
414 (60)	5.00	483 (70)	2.40	414 (60)	10.00
414 (60)	10.00	621 (90)	2.30	414 (60)	15.00
1710 (248)	10.00	814 (118)	1.70	1172 (170)	15.00
1944 (282)	9.60	1551 (225)	1.05	1772 (257)	11.60
1944 (282)	8.20	2517 (365)	0.75	3130 (454)	8.00
2317 (336)	8.20	4137 (600)	0.50	3130 (454)	4.60
3378 (490)	6.10	> 4137 (>600)	0.50	> 3130 (>454)	4.60
4020 (583)	5.50				
>4020 (>583)	5.50				

NOTE 22 **ROTOR DISK INTEGRITY AND ROTOR BLADE CONTAINMENT** (*where special requirements apply*)
Reserved.



MARIO IGAWA

Gerente Geral de Certificação de Produto Aeronáutico
(General Manager, Aeronautical Product Certification Branch)