Engines of models described herein conforming with this data sheet, which is part of Type Certificate No. 2016T06, 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**

High bypass turbofan engine, with: coaxial front fan/booster driven by a multi-stage low pressure turbine; a multi-stage compressor; two-stage high pressure turbine; annular pre swirl combustor, and a full authority digital engine control (FADEC).

**RATINGS**

(See Note 1)
### MODELS
LEAP-1A35A, LEAP-1A33, LEAP-1A33B2 and LEAP-1A32

<table>
<thead>
<tr>
<th>Static Thrust, at sea level, daN (lb.)</th>
<th>LEAP-1A35A</th>
<th>LEAP-1A33</th>
<th>LEAP-1A33B2</th>
<th>LEAP-1A32</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Takeoff - 5 min</td>
<td>14 305 (32 160)</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>- Maximum Continuous</td>
<td>14 096 (31 690)</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Flat Rating Ambient Temp., °C (°F)
- Takeoff - 5 min: 30 (86), 25 (77)
- Maximum Continuous – static: 30 (86)

### MODELS
LEAP-1A30, LEAP-1A26 and LEAP-1A26E1

<table>
<thead>
<tr>
<th>Static Thrust, at sea level, daN (lb.)</th>
<th>LEAP-1A30</th>
<th>LEAP-1A26</th>
<th>LEAP-1A26E1</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Takeoff - 5 min</td>
<td>14 305 (32 160)</td>
<td>12 064 (27 120)</td>
<td>--</td>
</tr>
<tr>
<td>- Maximum Continuous</td>
<td>14 096 (31 690)</td>
<td>11 868 (26 680)</td>
<td>--</td>
</tr>
</tbody>
</table>

Flat Rating Ambient Temp., °C (°F)
- Takeoff - 5 min: 30 (86), 44 (111), 25 (77)
- Maximum Continuous – static: 44 (111)

### MODELS
LEAP-1A24, LEAP-1A24E1 and LEAP-1A23

<table>
<thead>
<tr>
<th>Static Thrust, at sea level, daN (lb.)</th>
<th>LEAP-1A24</th>
<th>LEAP-1A24E1</th>
<th>LEAP-1A23</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Takeoff - 5 min</td>
<td>10 680 (24 010)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>- Maximum Continuous</td>
<td>10 676 (24 000)</td>
<td>--</td>
<td>10 458 (23 510)</td>
</tr>
</tbody>
</table>

Flat Rating Ambient Temp., °C (°F)
- Takeoff - 5 min: 45 (113), 55 (130), 45 (113)
- Maximum Continuous – static: 25 (77), --

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

<table>
<thead>
<tr>
<th>Component</th>
<th>LEAP-1A35A</th>
<th>LEAP-1A33</th>
<th>LEAP-1A33B2</th>
<th>LEAP-1A32</th>
<th>LEAP-1A30</th>
<th>LEAP-1A26</th>
<th>LEAP-1A26E1</th>
<th>LEAP-1A24</th>
<th>LEAP-1A24E1</th>
<th>LEAP-1A23</th>
</tr>
</thead>
<tbody>
<tr>
<td>FADEC ECU (P/N)</td>
<td>2500M34</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>2500M34</td>
<td>--</td>
<td>--</td>
<td>2500M34</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>FADEC Software (P/N)</td>
<td>2590M00</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>2590M00</td>
<td>--</td>
<td>--</td>
<td>2590M00</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>and FADEC Identification Plug (P/N)</td>
<td>2590M01</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>2590M01</td>
<td>--</td>
<td>--</td>
<td>2590M01</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>FADEC Identification Plug (P/N)</td>
<td>2531M61P02</td>
<td>2531M61P22</td>
<td>2531M61P24</td>
<td>2531M61P14</td>
<td>2531M61P06</td>
<td>2531M61P34</td>
<td>2531M61P30</td>
<td>2531M61P02</td>
<td>2531M61P34</td>
<td>2531M61P30</td>
</tr>
</tbody>
</table>

### IGNITION SYSTEM

The Leap-1A is equipped with two ignition exciters, two ignition leads and two igniter plugs.

### COMPONENTS AND CONFIGURATION

For details of components included in the Type Design Definition, refer to the Installation Manual.

"--" Same as previous model; "#" Not applicable
**FUEL TYPE**

Approved fuel conforming to GE Specification D50TF2, Classes A, C, D, and E. Primary fuel is D50TF2 Class-A (Jet A) with other fuels listed being acceptable alternates. No fuel control adjustment is required when changing from primary to alternate fuels. Use of aviation gasoline and D50TF2 Class-B, Wide-Cut Distillate (Jet B or JP-4) is not authorized.

Refer to the latest revision of CFM Service Bulletin LEAP-1A S/B 73-0001 for a list of fuels specifically approved for LEAP-1A engine.

**OIL TYPE**

- Approved oils are synthetic type conforming to SAE AS5780 specification, grade SPC (Standard Performance Capability) or HPC (High performance Capability).
- Refer to the latest revision of CFM Service Bulletin LEAP-1A S/B 79-0001 for a list of oil specifically approved for the LEAP-1A engine.

**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.

**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 12.

**AIR BLEED**

For maximum permissible air bleed extraction, see Note 13.

"--" Same as previous model; "#" Not applicable
<table>
<thead>
<tr>
<th>DIMENSIONS AND WEIGHT</th>
<th>LEAP-1AG01</th>
<th>LEAP-1AG02</th>
<th>LEAP-1AG03</th>
<th>LEAP-1AG04</th>
<th>LEAP-1AG05</th>
<th>LEAP-1AG06</th>
<th>LEAP-1AG07</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH, mm (in.)</td>
<td>3,328 (131.0)</td>
<td>3,328 (131.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fwd. fan case flange to TRF aft flange</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIDTH, mm (in.)</td>
<td>2,543 (100.1)</td>
<td>2,533 (99.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Envelope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HEIGHT, mm (in.)</td>
<td>2,368 (93.2)</td>
<td>2,362 (93.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Envelope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEIGHT, kg (lb.)</td>
<td>2,990 (6,591)</td>
<td>3,008 (6,632)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not to exceed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The engine weight is defined as the weight of the basic engine, including basic engine accessories and fluids weight (oil and fuel).

CENTER OF GRAVITY

Applicable to all models

Engine only, nominal weight, mm. (in.)
Station (Axial) | 5,400 (212.6)

-- HPC case fwd flange = 5080mm (200 in)

Waterline | 2,514.6 (99.0)

Buttline | 2,484.1 (97.8)

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

Each engine imported separately and/or spare parts must be accompanied by an Export Airworthiness Approval through the FAA Form 8130-3 or EASA Form 1, 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. 2016T06-01, 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. The ANAC type design corresponds to the FAA and EASA approved type designs, as stated in ANAC report number V.33-1079-00, dated 19 September 2016, or further revisions. (See Note 10).

CERTIFICATION BASIS

Brazilian Type Certificate No. 2016T06 issued on 16 September 2016 is based on RBAC 21.29 including the following requirements:

- RBAC 33 (Requisitos de aeronavegabilidade: motores aeronáuticos), Amendement 28; corresponding to 14 CFR Part 33, effective 01 February 1965, as amended by 33-1 through 33-28, inclusive; Additionally, based on RBAC 21.29(1)(a)(ii) the following requirements are applicable: 14 CFR Part 33, effective 01 February 1965, as amended by amendment 33-29 through amendment 33-33.

- Equivalent Level of Safety (ELOS) findings, raised by FAA:
  - No. LEAP1A1C-2014-TC-01-P-11 to 14 CFR 33.27(c): High Pressure Shaft Loss-of-Load.

- Special Condition, raised by FAA:
  - No. 33-015-SC: Fan Blade Special Condition

- RBAC 34 (Requisitos para drenagem de combustível e emissões de escapamento de aviões com motores a turbina, Amendement 05; corresponding to 14 CFR Part 34, effective 23 October 2013, amendment 5A, inclusive (see Note 14 for further information about certification basis for fuel venting and exhaust emissions);

- ICAO Annex 16, Vol. II, third edition, July 2008, including Amendment 7, 18AUG2011, as applicable to turbofan engines. NOx standards in accordance with Part III, Chapter 2, Section 2.3.2.e (CAEP/8), for emissions.

<table>
<thead>
<tr>
<th>Model</th>
<th>Application</th>
<th>Issued TC/Emended</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAP-1A35A</td>
<td>08 April 2016</td>
<td>08 February 2018</td>
</tr>
<tr>
<td>LEAP-1A33</td>
<td>08 April 2016</td>
<td>08 February 2018</td>
</tr>
<tr>
<td>LEAP-1A33B2</td>
<td>08 April 2016</td>
<td>08 February 2018</td>
</tr>
<tr>
<td>LEAP-1A32</td>
<td>08 April 2016</td>
<td>08 February 2018</td>
</tr>
<tr>
<td>LEAP-1A30</td>
<td>08 April 2016</td>
<td>08 February 2018</td>
</tr>
<tr>
<td>LEAP-1A26</td>
<td>08 April 2016</td>
<td>08 February 2018</td>
</tr>
</tbody>
</table>

"--" Same as previous model; "#" Not applicable
CERTIFICATION BASIS (Cont’d)

<table>
<thead>
<tr>
<th>Engine Model</th>
<th>Certification Date</th>
<th>Certification Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAP-1A26E1</td>
<td>08 April 2016</td>
<td>08 February 2018</td>
</tr>
<tr>
<td>LEAP-1A24</td>
<td>08 April 2016</td>
<td>08 February 2018</td>
</tr>
<tr>
<td>LEAP-1A24E1</td>
<td>08 April 2016</td>
<td>08 February 2018</td>
</tr>
<tr>
<td>LEAP-1A23</td>
<td>08 April 2016</td>
<td>08 February 2018</td>
</tr>
</tbody>
</table>

PRODUCTION BASIS


Production Certification No. FR.21G.0007 dated December 17th, 2009 for engines produced in France by Snecma under license from CFM International, S.A.

NOTES

NOTE 1

Engine ratings are based on calibrated stand performance under the following conditions:
- Takeoff thrust is nominally independent of ambient temperature (flat rated) up to ambient temperature of: Std + 15°C (30°C, 86°F) for all models, except as noted above.
- Maximum continuous thrust is nominally independent of ambient temperature (flat rated) up to ambient temperature of Std. + 10°C (25°C, 77°F) for all models
  - Sea level static, standard day: 101.325 kPA Pressure (14.696 psia); 15°C temperature (59°F)
  - Zero customer bleed or customer horsepower extraction
  - Ideal inlet, 100% ram recovery
  - Production aircraft flight cowling
  - Production instrumentation
  - Fuel lower heating value of 18,400 BTU/lb

THRUST SETTING PARAMETER

Power setting, power checks and control of engine thrust output in all operations is to be based on CFM International engine charts referring to fan speed. Fan speed sensors are included in the engine assembly for this purpose.
## NOTE 2

**TEMPERATURE LIMITS:**

- **Indicated Turbine Exhaust Gas Temperature, °C (°F):**
  - Takeoff - 5 minutes: 1060 (1940)
  - Maximum continuous: 1025 (1877)
  - Max Transient (30 sec.): 1065 (1949)

  | Ground Starts | 750 (1382) |
  | Inflight Starts | 875 (1607) |

- **Fuel Pump Inlet Temperature, °C (°F):**
  - Maximum: 55 (131)
  - Maximum (Cold Start)*: -54 (–65.2) *Or the relevant fuel freezing point, whichever is higher

- **Oil Temperature, °C (°F):**
  - Maximum
    - Continuous Operation: 140 (284)
    - Transient (15 minutes): 155 (311)
  - Minimum (Cold Start)
    - Engines Not Compliant with LEAP-1A S/B 72-0034, 72-0035, & 72-0036: –29 (–20)
    - Engines Compliant with LEAP-1A S/B 72-0034, 72-0035, & 72-0036: –40 (–40)

  **Minimum for Acceleration to Take-Off Power:** 19 (66)

## NOTE 3

**FUEL AND OIL PRESSURE LIMITS:**

- **Fuel Pressure Limits (measured at engine pump inlet):**
  - Aircraft Boost Pump Operative
    - The minimum pressure at the engine fuel pump inlet with aircraft boost pumps operative is true vapor pressure plus 5 psia (32.4 kPa). The maximum vapor to liquid ratio at the engine fuel pump inlet with aircraft boost pumps operative is zero.
  - Aircraft Boost Pump Inoperative

*--* Same as previous model; *#* Not applicable
NOTE 3  
Cont’d
- Fuel Pressure Limits (measured at engine pump inlet):
  Aircraft Boost Pump Operative
  The minimum pressure at the engine fuel pump inlet with aircraft boost pumps operative is true vapor pressure plus 5 psia (32.4 kPa). The maximum vapor to liquid ratio at the engine fuel pump inlet with aircraft boost pumps operative is zero.
  Aircraft Boost Pump Inoperative
  The engine fuel system operation is restricted with the aircraft boost pumps inoperative as outlined in the LEAP-1A Installation Manual.
- Oil Pressure Limits:
  – The minimum pressure limit at idle is 17.4 psid (120.0 kPa) and varies up to 29 psid (200.0 kPa) at redline.
  – The maximum pressure is limited during cold starts by a 420.5 psid (2900 kPa differential) pressure-relief valve.

NOTE 4  
ACCESSORY DRIVE CHARACTERISTICS
- ELECTRICAL (IDG)*
  Rotation Direction  
    + CCW
  Speed ratio to core**  
    0.462
  Pad Rating kW (HP)  
    129 (173)
  Shear Torque N.m (in.lb)  
    106 (938)
  Maximum overhung moment (wet) N.m (in.lb)  
    113 (1000)

- HYDRAULIC PUMP*
  Rotation Direction  
    CCW
  Speed ratio to core**  
    0.211
  Pad Rating kW N.m (in.lb))  
    147 (1301)
  Shear Torque N.m (in.lb)  
    480 (4249)
  Maximum overhung moment (wet) N.m (in.lb)  
    23 (204)

* Airframer Supplied Hardware
+ CCW = COUNTERCLOCKWISE (looking at the Pad)
** 100% core speed = 16,645 RPM

"--" Same as previous model; "#" Not applicable
### NOTE 5

**ENGINE MODEL CHARACTERISTICS:**

The models shown on this TCDS have the following general characteristics:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAP-1A35A</td>
<td>A321neo Configuration, with additional takeoff thrust at high altitude conditions.</td>
</tr>
<tr>
<td>LEAP-1A33</td>
<td>Same as LEAP-1A30, except for higher thrust rating.</td>
</tr>
<tr>
<td>LEAP-1A33B2</td>
<td>Same as LEAP-1A33, except for additional pilot-selected takeoff thrust capability.</td>
</tr>
<tr>
<td>LEAP-1A32</td>
<td>Same as LEAP-1A30, except for higher thrust rating.</td>
</tr>
<tr>
<td>LEAP-1A30</td>
<td>A321neo Configuration.</td>
</tr>
<tr>
<td>LEAP-1A26</td>
<td>A320neo Configuration</td>
</tr>
<tr>
<td>LEAP-1A26E1</td>
<td>Same as LEAP-1A26, except for extended ambient temperature takeoff thrust capability.</td>
</tr>
<tr>
<td>LEAP-1A24</td>
<td>Same as LEAP-1A23, except for higher thrust rating.</td>
</tr>
<tr>
<td>LEAP-1A24E1</td>
<td>Same as LEAP-1A24, except for extended ambient temperature takeoff thrust capability.</td>
</tr>
<tr>
<td>LEAP-1A23</td>
<td>A319neo Configuration.</td>
</tr>
</tbody>
</table>

The parts list for each LEAP-1A engine model contains a configuration group number to differentiate between the following configurations:

<table>
<thead>
<tr>
<th>Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G01</td>
<td>Initial release configuration. Aluminum fan frame.</td>
</tr>
<tr>
<td>G02</td>
<td>Same as G01, with Titanium fan frame.</td>
</tr>
<tr>
<td>G03</td>
<td>Same as G02 with EEC fire blanket.</td>
</tr>
<tr>
<td>G04</td>
<td>Same as G03, with single valve MTC</td>
</tr>
<tr>
<td>G05</td>
<td>Same as G04, with improved performance booster.</td>
</tr>
<tr>
<td>G06</td>
<td>Same as G05, with fan case flange shim.</td>
</tr>
<tr>
<td>G07</td>
<td>Same as G06, with optimized valve packaging.</td>
</tr>
</tbody>
</table>

### NOTE 6

**COMPATIBLE SYSTEM ASSEMBLIES**

**THRUST REVERSER**

The LEAP-1A engine is approved for use with the Aircelle thrust reverser system: P/N BDL0011-12-0 for the left hand thrust reverser half; and P/N BDL0051-12-0 for the right hand thrust reverser half.
NOTE 7  SPECIAL REQUIREMENTS

ETOPS

The LEAP-1A35A, -1A33, -1A33B2, -1A32, -1A30, -1A26, -1A26E1, -1A24, -1A24E1, -1A23 engines models comply with the requirements of §§ 33.4 (A33.3(c)), 33.71(c)(4) and 33.201, and are therefore eligible for installation on Extended Operations (ETOPS) and Early ETOPS approved airplanes. The demonstrated diversion time is 180 minutes at maximum continuous thrust plus 15 minutes at hold power. ETOPS eligibility does not constitute airplane or operational level approvals necessary to conduct ETOPS flights.

LEAP-1A S/B 71-0006 defines the requirements for conducting ETOPS operation.

TIME LIMITED DISPATCH CRITERIA

Criteria pertaining to the dispatch and maintenance requirements for the engine control systems are specified in the airworthiness limitation section of the LEAP-1A Engine Shop Manual (LEAP-1A-05-17-00), which defines the various configurations and maximum operating intervals.

A control system reliability monitoring program has been established with LEAP, as a contingency of the dispatch criteria approval, to ensure that overall engine control system and specific component failure rates do not exceed the maximum values permitted by the reliability analysis.

NOTE 8  SPECIAL OPERATING PROCEDURES

Negative G Operation

During negative g operation only, it is permissible to operate below minimum oil pressure (17.4 psid) for a maximum of 14 seconds. See LEAP-1A Specific Operating Instruction Manual, GEK 131717.

Minimum Flight Idle

The minimum permissible idle in flight is a non-adjustable limit, preset into the EEC Control schedule. Flight idle is engaged based on thrust lever position and operating conditions as specified in the LEAP-1A Specific Operating Instructions Manual, GEK 131717.

Takeoff Time Limit

The normal 5 minute takeoff rating may be extended to 10 minutes for engine out contingency, as specified in the LEAP-1A Specific Operating Instructions Manual, GEK 131717.

Icing Operation

For operation in icing conditions; requirements, limitations, and notes are specified in the LEAP-1A Specific Operating Instructions Manual, GEK 131717.

"--" Same as previous model; "#" Not applicable
NOTE 9  The applicable installation and operating manuals are:

1) Turbofan Engine Installation Manual (EIM):
   • LEAP-1A…G01 CRL-2106a (IM.20)
   • LEAP-1A…G02 thru G05 CRL-2106a_3 (IM.20.3)

2) Specific Operating Instructions (SOI): CRL-2105a (GEK 131717)

Instructions for Continued Airworthiness (ICA): Installation Manuals, Specific Operating Instructions, Engine Shop Manuals, Service Bulletins, Overhaul and Maintenance Manuals, Repair Manuals, Vendor Manuals, and Design Changes which contain a statement that the document is EASA approved or approved under authority of DOA No. EASA.21J.086 are accepted by the ANAC and considered ANAC approved. Repair data and related instructions are considered ANAC approved or accepted as applicable. These approvals pertain to the type design only. The LEAP-1A ICA includes:

1) Engine Shop Manual (ESM): SM.20
3) Consumable Product Manual (CPM): CPM.25
4) Non Destructive Test Manual (NDTM): NDTM.25
5) Components Maintenance Manuals (CMM): as published by CFM
6) Service Bulletins (SB): as published by CFM
7) Maintenance Manual: see Aircraft Maintenance Manual (AMM)
8) Troubleshooting Manual: see Aircraft Troubleshooting Manual (TSM)

NOTE 10  IMPORT REQUIREMENTS

The type certificate holder, CFM International, S.A., is a company established and jointly owned by Snecma of France and the General Electric Company for the certification, sale, and support of CFM56 & LEAP series engines. The LEAP-1A engine series is a product line designed to power the Airbus A319neo/320neo/321neo aircraft. With respect to the benefits of type certification for production, General Electric and Snecma function as licensees of CFM International, S.A.

All LEAP-1A engines will be assigned serial numbers sequentially, with the three-digit prefix “598-“, regardless of engine final assembly location. The location of final assembly can be inferred from the engine manufacturer, which will be identified on the engine nameplate, along with the date of production. Engines produced in the United States by GE are identical to and fully interchangeable with engines produced in France by Snecma.
NOTE 10  (Cont’d) Modules, assemblies, or parts produced in France are eligible for use in engines produced to this type certificate provided an export airworthiness approval (EASA Form 1 – Authorized Release Certificate or JAA Form 1) issued by Snecma under authority of European Aviation Safety Agency (EASA) Production Certificate No. FR.21G.0007 is attached to the item or invoice covering shipment of items.

NOTE 11  CRITICAL ENGINE PARTS
Life limits established for critical engine parts are published in the ALS section of Chapter 05 of the LEAP-1A Engine Shop Manual, ESM.20.

NOTE 12  MAXIMUM PERMISSIBLE ENGINE ROTOR SPEEDS

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TEMPERATURE CORRECTED FAN SPEED</th>
<th>TEMPERATURE CORRECTED FAN SPEED</th>
<th>TEMPERATURE CORRECTED FAN SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPOOL</td>
<td>RPM</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Low pressure rotor (N1)</td>
<td>3894</td>
<td>101.0</td>
<td></td>
</tr>
<tr>
<td>High pressure rotor (N2)</td>
<td>19 391</td>
<td>116.5</td>
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</tr>
</tbody>
</table>

NOTE 13  MAXIMUM PERMISSIBLE BLEED AIR EXTRACTION

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TEMPERATURE CORRECTED FAN SPEED</th>
<th>TEMPERATURE CORRECTED FAN SPEED</th>
<th>TEMPERATURE CORRECTED FAN SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPC Stage 4</td>
<td>All speeds above minimum idle.</td>
<td>9.97% core airflow*</td>
<td></td>
</tr>
<tr>
<td>HPC Stage7</td>
<td>Above 2314 RPM</td>
<td>2.45% core airflow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Below 2314 RPM</td>
<td>2.9% core airflow</td>
<td></td>
</tr>
<tr>
<td>HPC Stage10</td>
<td>All speeds above minimum idle.</td>
<td>15.0% of core airflow</td>
<td></td>
</tr>
<tr>
<td>Bypass Duct</td>
<td>All speeds above minimum idle.</td>
<td>2 % of secondary airflow</td>
<td></td>
</tr>
</tbody>
</table>

*Absolute maximum. Refer to the LEAP-1A Installation Manual, for detailed Stage 4 bleed schedule.

NOTE 14  EXHAUST EMISSIONS AND FUEL VENTING
The following emissions standards promulgated in RBAC 34, amendment 05, which corresponds to 14 CFR Part 34, Amendment 5A, effective October 23, 2013, have been complied with for all LEAP-1A.
– 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);

*--* Same as previous model; *#* Not applicable
NOTE 14 (Cont’d)

- Carbon Monoxide (CO) Emission Standards: RBAC 34.21(d)(1)(ii), which corresponds to 14 CFR 34.21(d)(I)(ii);
- Hydrocarbons (HC) Emission Standards: RBAC 34.21(d)(1)(i), which corresponds to 14 CFR 34.21(d)(1)(i);
- Oxides of Nitrogen (NOx) 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.1(i) for NOx (also known as CAEP/8), and Part II Chapter 2 for fuel venting have also been demonstrated.

NOTE 17

Service Bulletins, Structural Repair Manuals, Vendor Manuals, and Engine Maintenance Manuals, with contain a statement that the document is FAA-approved, are acceptable by the ANAC and are considered ANAC-approved unless otherwise noted. These approvals pertain to the type design only.

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