



TYPE-CERTIFICATE DATA SHEET

No. E.115

for Engine
LEAP-1B series engines

Type Certificate Holder
CFM International SA

CFM International SA
2, boulevard du Général Martial Valin
75015 Paris
France

For Models:
LEAP-1B28
LEAP-1B28B2



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I. General

1. Type / Models

LEAP-1B	LEAP-1B28, LEAP-1B28B2
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2. Type Certificate Holder

CFM International SA
2, boulevard du Général Martial Valin
75015 Paris
France

Design Organisation Approval No.: EASA.21J.086

3. Manufacturers

<p style="text-align: center;">Snecma Production Organisation Approval FR.21G.0007 10 allée du Brévent - CE 1420 - Courcouronnes 91019 Evry Cedex France</p>	<p style="text-align: center;">GE Production Certification No. 108 One Neumann Way Cincinnati - Ohio 45215 United States of America</p>
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(See note 4)

4. Date of Application

LEAP-1B28, LEAP-1B28B2	09 May 2013
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5. EASA Type Certification Date

LEAP-1B28, LEAP-1B28B2	04 May 2016
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II. Certification Basis

1. Reference Date for determining the applicable airworthiness requirements:

09 May 2013

2. EASA Certification Basis

2.1. Airworthiness Standards

CS-E amendment 3 (23 December 2010)

2.2. Special Conditions (SC)

SC1: Fan Blade Containment - Woven Composite Fan Blade

SC2: 30 Seconds Transient Over-Temperature Approval

2.3. Equivalent Safety Findings (ESF)

ESF1: CS-E 740 Endurance Tests – Alternative Schedule

ESF2: CS-E 840 Rotor Integrity – High Pressure Turbine Stage 2 Rotor Compliance



2.4. Deviations

None

2.5. Environmental Protection

LEAP-1B28, LEAP-1B28B2	ICAO Annex 16 Volume II, third edition, July 2008, including Amendment 8, 14/7/14, as applicable to turbofan engines
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III. Technical Characteristics

1. Type Design Definition

Engine type is identified by an engine part list reference and an engine identification plug reference:

LEAP-1B	Engine part list reference
LEAP-1B28, LEAP-1B28B2	2540M10G01, 2540M10G02, 2540M10G03

	Engine identification plug reference		Engine identification plug reference
LEAP-1B28	2531M61P26	LEAP-1B28B2	2531M61P28

2. Description

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

- single stage fan, 3-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 part list for details.

4. Dimensions (mm)

Length (fan case forward flange to turbine rear frame aft flange): 3147

Width (maximum envelope): 2421

Height (maximum envelope): 2256

5. Weight (kg)

Weight of the dry engine, including basic engine equipment, will not exceed 2780 kg



6. Ratings

LEAP-1B - Take-Off Thrust			
LEAP-1B28 LEAP-1B28B2	Reserved	Reserved	Reserved
13041 daN	-	-	-

LEAP-1B - Maximum Continuous Thrust			
LEAP-1B28 LEAP-1B28B2	Reserved	Reserved	Reserved
12762 daN	-	-	-

(See notes 2 and 3)

Engine models which have the same approved ratings in standard static conditions will provide different level of thrust at altitude and/or high temperature conditions. This is controlled by the engine identification plug.

7. Control System

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

	LEAP-1B28 LEAP-1B28B2
Factory Loadable Software P/N	2474M64P03
Pressure Sub Systems (PSS) Software P/N	2474M65P06
Application Software AS1, AS2, AS4 (P2020) P/N	2628M86P02
Application Software AS3 (PHM) P/N	2628M87P02
Application Software (AML) P/N	2697M83P01
Health Monitoring (OMAP) Software P/N	2628M88P01

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

Fuel and fuel additives: Refer to the latest revision of CFM Service Bulletin LEAP-1B S/B 73-0001

Oil: Refer to the latest revision of CFM Service Bulletin LEAP-1B S/B 79-0001

9. Aircraft Accessory Drives

LEAP-1B						
Component	Rotation direction	Speed ratio / HP rotor	Max. power or max. torque	Max. shear torque (m.daN)	Max. weight (wet) (kg)	Max. overhung moment (m.daN)
Electrical generator	CW	0.418	125 kW	106.3	60.7	10.8
Hydraulic pump	CW	0.191	15.9 m.daN	40.7	15	1.9

CW = clockwise when facing the gearbox drive pad



10. Maximum Permissible Air Bleed Extraction

LEAP-1B		
Bleed location	LP rotor speed	Airflow limit
Bypass duct	Above minimum idle	1 % of secondary airflow
HPC 4 th stage	Above minimum idle	10% of primary airflow*
HPC 10 th stage	Above minimum idle	15% of primary airflow*

*Absolute maximum. Refer to the LEAP-1B Installation Manual for detailed bleed schedule.
It is not allowed to extract air from 4th and 10th stages simultaneously.

IV. Operating Limitations

1. Temperature Limits

1.1. Exhaust Gas Temperature (°C):

The Exhaust Gas Temperature (EGT=T48) is measured at the low pressure turbine inlet.

Maximum Exhaust Gas Temperature (Indicated):

- Take-Off: 1038
- Maximum Continuous: 1013
- Ground Start: 753
- Inflight Start: 883

All models are certified for a transitory exhaust gas temperature (EGT) exceedance at take-off of 10°C, during 30 seconds maximum. Refer to the applicable "Specific Operating Instructions" document.

1.2. Oil Temperature (°C)

Minimum for starting:	minus 19
Minimum for acceleration to take-off power:	11
Maximum steady state:	140
Maximum transient (15 minutes):	155

1.3. Fuel Inlet Temperature (°C)

Minimum:	minus 43
Maximum steady state:	54.5

1.4. Engine Equipment Temperatures:

Refer to the applicable engine "Installation Manual" document for engine equipment steady state and transient skin temperature limits.

2. Speed Limits

2.1. Maximum Rotational Speeds (rpm=revolutions per minute):

Low pressure rotor (N1):	4586	(104.3 % - 100 % N1 is defined as 4397 rpm)
High pressure rotor (N2):	20171	(117.5 % - 100 % N2 is defined as 17167 rpm)



3. Pressure Limits

3.1. Fuel Pressure:

Minimum: 345 hPa (differential pressure)

Maximum: 3790 hPa (differential pressure)

When the engine is running, the fuel pressure at the engine pump inlet must be kept 345 hPa above the true vapour pressure of the fuel with a zero vapour/liquid ratio under normal operating conditions.

3.2. Oil Pressure:

Minimum at Idle conditions: 1200 hPa (differential pressure)

Minimum at 117.5% N2 (redline): 2000 hPa (differential pressure)

When the engine is running, the oil pressure varies with the rotational speed of the HP rotor (Refer to the applicable engine "Installation Manual" document). Deliberate operation of the engine with oil pressure below minimum is prohibited. However, aircraft "negative g" manoeuvres may cause temporary oil supply interruption. Under "negative g" operating conditions only, it is permissible to operate the engine below the minimum oil pressure for a maximum of 10 seconds before engine shutdown is required.

4. Time Limited Dispatch (TLD)

The engine is approved for Time Limited Dispatch in accordance with CS-E 1030. The maximum rectification period for each dispatchable state is specified in the applicable "Engine Shop Manual" document, chapter 5 "Airworthiness Limitations".

5. ETOPS Capability

The engine is not approved for ETOPS capability in accordance with CS-E 1040.

V. Operating and Service Instructions

Manuals	LEAP-1B
Turbofan Engine Installation Manual (EIM)	CRL-2106b Revision 2 (LEAP-1BG01)
	CRL-2106b_G02 Revision 1 (LEAP-1BG02)
	CRL-2106b_G03 Revision 1 (LEAP-1BG03)
Installation Drawing	CRL-2107b Revision 1 (LEAP-1BG01)
	CRL-2107b_G02 Revision 0 (LEAP-1BG02)
	CRL-2107b_G03 Revision 0 (LEAP-1BG03)
Specific Operating Instructions (SOI)	CRL-2105b Revision 0

Or later approved Issues or Revisions



Instructions for Continued Airworthiness (ICA)	LEAP-1B
Maintenance Manual	See Aircraft Maintenance Manual (AMM)
Fault Isolation Manual	See Aircraft Fault Isolation Manual (FIM)
Engine Shop Manual (ESM)	ESM.21
Standard Practices Manual (SPM)	SPM.25
Consumable Product Manual (CPM)	CPM.25
Non Destructive Test Manual (NDTM)	NDTM.25
Components Maintenance Manuals (CMM)	As published by CFM
Service Bulletins (SB)	As published by CFM

VI. Notes

1. The EASA approved Airworthiness Limitations Section of the Instructions for Continued Airworthiness is published in the applicable "Engine Shop Manual" document, chapter 5 "Airworthiness Limitations".
2. Engine ratings are based on calibrated test stand performance, and performance calculations are based on accepted parameter correction methods documented in the "Production Test Requirements" document. These calculations assume the following conditions:
 - Sea level corner point conditions as defined in the "Production Test Requirements";
 - No aircraft accessory loads or air extraction;
 - No anti-icing; no inlet distortion; no inlet screen losses; and 100% ram recovery;
 - Production engine inlet and production exhaust system.
3. 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.
4. The type certificate holder, CFM International, is a company jointly owned by Snecma (France) and GE (USA). CFM International is responsible for the certification program, the sale and the customer support activities. With respect to the benefits of type certification for production of certified engines, Snecma and GE act as licensees of CFM International. The engine final assembly location is recorded on the engine identification plate.
5. The LEAP-1B engine is approved for use with Boeing thrust reverser system P/N 315A6295.



SECTION: ADMINISTRATIVE

I. Acronyms and Abbreviations

AML Application Specific Memory Loader
OMAP™ Open Multimedia Applications Platform

II. Type Certificate Holder Record

n/a

III. Change Record

TCDS Issue	Date	Changes	TC issue date
Issue 01	04 May 2016	Initial issue with LEAP-1B28 and LEAP-1B28B2models	Initial Issue, 04 May 2016

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