

型号认可证数据单

THE VALIDATION DATA SHEET

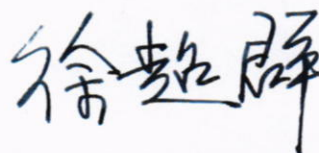
编号/No.: VTC0348E

版次/Revision: 0

型号/Type:

LEAP-1A23 LEAP-1A24
LEAP-1A24E1 LEAP-1A26
LEAP-1A26E1 LEAP-1A30
LEAP-1A32 LEAP-1A33
LEAP-1A33B2 LEAP-1A35A

批准人/Approved by: Xu Chaoqun



职务/Title: Director General of CAAC-AAD

日期/Date: 2018 年 3 月 30 日

本数据单是型号认可证（编号 VTC0348E）的组成部分，它规定了符合中国民用航空局的适航要求所颁发此型号认可证的产品状态和限制。

This data sheet, which is a part of Validation Type Certificate (No: VTC0348E), prescribes conditions and limitations under which the product for which the Type Certificate was issued meets the airworthiness requirements of the Chinese Civil Aviation Regulation.

型号认可证持有人/Validation of Type Certificate Holder:

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

有效页清单/List of effective pages :

页数/Pages	1	2	3	4	5	6	7	8	9	10	11	12	13	14
版次/Revision	0	0	0	0	0	0	0	0	0	0	0	0	0	0
页数/Pages	15	16	17											
版次/Revision	0	0	0											

第1部分 概述

SECTION 1 GENERAL

1. CAAC认可数据单和型号合格证数据单/CAAC Validation Data Sheet and Type Certificate Data Sheet

	中国民用航空局认可数据单号、版次和颁发日期 CAAC Validation Data Sheet Number, Revision and issuance date	型号合格证数据单号、版次和颁发日期 Type Certificate Data Sheet Number, Revision and issuance date
当前 Current	VTC0348E, 版次0, 2018年3月30日; No. VTC0348E, Revision 0, March 30, 2018	EASA TCDS No.E.110, 第6版, 2017年11月2日 EASA TCDS No.E.110, Revision 6, Nov. 02, 2017
历史 History	无 None	

2. 类别/Category: 发动机/Engine
3. 认可当局/Validation Authority: 中国民用航空局/CAAC
审定当局/Certifying Authority: 欧洲航空安全局/EASA
4. 型号合格证持有人:
Type Certificate Holder: CFM International SA
2, boulevard du Général Martial Valin
75015 Paris
France
6. ETOPS: 适用/Applicable
7. CAAC 专用要求/Special Requirements: 满足中国 3 号燃油 (GB6537-2006) 的要求。
Compliance with requirement of P.R.China
JET Fuel No.3 (GB6537-2006).

第2部分 数据单

SECTION 2 DATA SHEET

I. 概述/ General

1. 型号/Type/Models

LEAP-1A	LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26E1, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2, LEAP-1A35A
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2. 型号合格证持有人/Type Certificate Holder

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

设计组织批准号: EASA.21J.086
Design Organisation Approval No.: EASA.21J.086

3. 制造商/Manufacturers

赛峰发动机/Safran Aircraft Engines 生产组织批准 FR.21G.0007 Production Organisation Approval FR.21G.0007 10 allée du Brévent - CE 1420 - Courcouronnes 91019 Evry Cedex France	通用电气/GE 生产许可证 No. 108 Production Certification No. 108 One Neumann Way Cincinnati - Ohio 45215 United States of America
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(见注 4) / (See note 4)

4. 申请日期/Date of Application

LEAP-1A35A	2012 年 2 月 6 日 06 February 2012
LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26E1, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2	2015 年 11 月 24 日 24 November 2015

5. EASA 颁证日期/EASA Type Certification Date

LEAP-1A35A	2015 年 11 月 20 日 20 November 2015
LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26E1, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2	2016 年 3 月 11 日 11 March 2016

II. 审定基础/Certification Basis**1. 确定适航要求的参考日期 / Reference Date for determining the applicable airworthiness requirements:**

2012 年 11 月 20 日（根据 21 部第 21.A.17 条，在取得型号合格证前三年内）

20 November 2012 (3 years prior to initial Type Certification date according to Part 21.A.17)

2. EASA 审定基础 / EASA Certification Basis**2.1 适航标准 / Airworthiness Standards**

CS-E 第 3 修正案，2010 年 12 月 23 日生效

CS-E amendment 3 (23 December 2010)

2.2 专用条件 / Special Conditions (SC)

专用条件 1: 风扇叶片包容—编织复合材料风扇叶片

SC1: Fan Blade Containment - Woven Composite Fan Blade

专用条件 2: 30 秒瞬时超温批准

SC2: 30 Seconds Transient Over-Temperature Approval

2.3 等效安全 (ESF) / Equivalent Safety Findings (ESF)

等效安全 1: CS-E 740 持久试验—替代试验谱

ESF1: CS-E 740 Endurance Tests – Alternative Schedule

等效安全 2: CS-E 840 转子完整性 – 高压涡轮第二级转子符合性

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

2.4 偏离 / Deviations

无 / None

2.5 环境保护 / Environmental Protection

LEAP-1A35A	适用 ICAO 附件 16，卷 2，第 3 版，2008 年 7 月，包含 2011 年 8 月 18 日第 7 修正案中适用于涡扇发动机的要求。氮氧化物的标准与第 2 章第 2.3.2 条 e 款（CAEP/8）一致。 ICAO Annex 16 Volume II, third edition, July 2008, including Amendment 7, 18/08/11, as applicable to turbofan engines. NOx standards in accordance with Chapter 3, 2.3.2e (CAEP/8)
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LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26E1, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2	适用 ICAO 附件 16, 卷 2, 第 3 版, 2008 年 7 月, 包含 2014 年 7 月 14 日第 8 修正案中适用于涡扇发动机的要求。氮氧化物的标准与第 2 章第 2.3.2 条 e 款 (CAEP/8) 一致。 ICAO Annex 16 Volume II, third edition, July 2008, including Amendment 8, 14/7/14, as applicable to turbofan engines. NOx standards in accordance with Chapter 3, 2.3.2e (CAEP/8)
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III. 技术特性/Technical Characteristics

1. 型号设计定义/Type Design Definition

发动机型号由型号列表识别, 列表中包含识别塞编号:

Engine type is identified by an engine model list including an identification plug reference:

LEAP-1A	发动机型号清单 / Engine model list
LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26E1, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2, LEAP-1A35A	LEAP-1A..G01*, LEAP-1A..G02*, LEAP-1A..G03*, LEAP-1A..G04*, LEAP-1A..G05*, LEAP-1A..G06*, LEAP-1A..G07*, *..表示型号额定值 / *.. denotes model rating

(见注 6) / (See note 6)

LEAP-1A	发动机识别塞编号 Engine identification plug reference	LEAP-1A	发动机识别塞编号 Engine identification plug reference
LEAP-1A23	2531M61P54	LEAP-1A30	2531M61P06
LEAP-1A24	2531M61P62	LEAP-1A32	2531M61P14
LEAP-1A24E1	2531M61P58	LEAP-1A33	2531M61P22
LEAP-1A26	2531M61P34	LEAP-1A33B2	2531M61P24
LEAP-1A26E1	2531M61P30	LEAP-1A35A	2531M61P02

2. 描述 / Description

该发动机是双转子、轴流式、高涵道比的涡扇发动机:

- 单级风扇, 3 级低压压气机 (LPC), 10 级高压压气机 (HPC)
- 环形燃烧室
- 2 级高压涡轮 (HPT), 7 级低压涡轮 (LPT)
- 双通道全权限数字发动机控制 (FADEC)

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), 7-stage low pressure turbine (LPT)
- dual channel full authority digital engine control (FADEC)

3. 设备 / Equipment

发动机启动机是型号设计的一部分。具体信息参考发动机型号清单。

The engine starter is part of the engine type design. Refer to the engine model list for details.

4. 尺寸（毫米） / Dimensions (mm)

	LEAP-1A..G01	LEAP-1A..G02, G03, G04, G05, G06, G07
长度（风扇机匣前安装边到涡轮后机匣后安装边） Length (fan case forward flange to turbine rear frame aft flange)	3328	3328
宽度（最大轮廓线） Width (maximum envelope)	2543	2533
高度（最大轮廓线） Height (maximum envelope)	2368	2362

5. 重量（千克） / Weight (kg)

在适用的“发动机安装手册”中给出了基础发动机的重量，基础发动机包括基本的发动机设备。

Weight of the basic engine, including basic engine equipment, as given in the applicable engine “Installation Manual” document:

	LEAP-1A..G01	LEAP-1A..G02, G03, G04, G05, G06, G07
包括流体（滑油、燃油） With fluids (oil, fuel)	2990	3008

6. 额定值 / Ratings

LEAP-1A - 起飞推力 / LEAP-1A - Take-Off Thrust			
LEAP-1A23	LEAP-1A24 LEAP-1A24E1	LEAP-1A26 LEAP-1A26E1	LEAP-1A30 LEAP-1A32 LEAP-1A33 LEAP-1A33B2 LEAP-1A35A
10680 大牛/daN	10680 大牛/daN	12064 大牛/daN	14305 大牛/daN

LEAP-1A - 最大连续推力 / LEAP-1A - Maximum Continuous Thrust
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LEAP-1A23	LEAP-1A24 LEAP-1A24E1	LEAP-1A26 LEAP-1A26E1	LEAP-1A30 LEAP-1A32 LEAP-1A33 LEAP-1A33B2 LEAP-1A35A
10458 大牛/daN	10676 大牛/daN	11868 大牛/daN	14096 大牛/daN

(见注 2 和注 3) / (See notes 2 and 3)

标准静态条件下，具有相同批准额定值的发动机，在不同高度和温度下提供不同等级的推力。这种情况是由发动机识别塞控制的。

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. 控制系统 / Control System

在初始审定时，软件是发动机型号设计的一部分

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

	LEAP-1A35A	LEAP-1A23, -1A24, -1A24E1, -1A26, -1A26E1, -1A30, -1A32, -1A33, -1A33B2
工厂可加载软件件号 Factory Loadable Software P/N	2500M34P03	2500M34P03
应用软件件号 Application Software P/N	2590M00P02	2590M00P03
健康监测软件件号 Health Monitoring Software P/N	2590M01P01	2590M01P01
压力分系统 (PSS) 软件件号 Pressure Sub Systems (PSS) Software P/N	2474M65P05	2474M65P05

8. 流体 (燃油、滑油、冷却液及添加剂) / Fluids (Fuel, Oil, Coolant, Additives)

燃油和燃油添加剂：参考最新版 CFM 服务通告 LEAP-1A S/B 73-0001 和 LEAP-1C S/B 73-0001。

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

滑油：参考最新版 CFM 服务通告 LEAP-1A S/B 79-0001 和 LEAP-1C S/B 79-0001。

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

9. 飞机附件驱动 / Aircraft Accessory Drives

LEAP-1A						
部件 Component	转动方向 Rotation direction	速度比/高压转子 Speed ratio / HP rotor	最大功率或最大扭矩 Max. power or max. torque	最大剪切扭矩 (米·大牛) Max. shear torque (m.daN)	最大重量(湿重)(公斤) Max. weight (wet) (kg)	最大悬挂扭矩 (米·大牛) Max. overhung moment (m.daN)
发电机 Electrical generator	CCW	0.462	129 kW	106.2	65	11.3
液压泵 Hydraulic pump	CCW	0.211	14.7 米·大牛 / m.daN	48	17.5	2.3

CW = 面对齿轮箱安装座时, 顺时针方向 / clockwise when facing the gearbox drive pad

CCW = 面对齿轮箱安装座时, 逆时针方向 / counter-clockwise when facing the gearbox drive pad

10. 最大允许引气 / Maximum Permissible Air Bleed Extraction

LEAP-1A		
引气位置 / Bleed location	低压转子转速 / LP rotor speed	流量限制 / Airflow limit
旁通管路 / Bypass duct	高于最小慢车 Above minimum idle	二次流流量的 2% 2 % of secondary airflow
高压压气机第 4 级 HPC 4 th stage	高于最小慢车 Above minimum idle	主流流量的 9.97%* 9.97% of primary airflow*
高压压气机第 7 级 HPC 7 th stage	N1K 低于 2314 转/分** Below 2314 rpm N1K**	主流流量的 2.9% 2.9% of primary airflow
	N1K 高于 2314 转/分** Above 2314 rpm N1K**	主流流量的 2.45% 2.45% of primary airflow
高压压气机第 10 级 HPC 10 th stage	高于最小慢车 Above minimum idle	主流流量的 15% 15% of primary airflow

*最大绝对值。参考 LEAP-1A 安装手册中高压压气机第 4 级引气。

*Absolute maximum. Refer to the LEAP-1A Installation Manual for detailed HPC 4th stage bleed schedule.

**N1K = 经过温度修正后的风扇转子转速。

**N1K = Temperature corrected fan rotor speed.

第 4 级和第 10 级同时引气是不允许的。

It is not allowed to extract air from 4th and 10th stages simultaneously.

IV. 运行限制/Operating Limitations

1. 温度限制/Temperature Limits

1.1 排出燃气温度 (°C) /Exhaust Gas Temperature (°C):

排出燃气温度 (EGT=T48) 是在低压涡轮入口处测量的温度。最大排出燃气温度 (指示的温度) 为:

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

- 起飞 / Take-Off: 1060
- 最大连续 / Maximum Continuous: 1025
- 地面启动 / Ground Start: 750
- 空中启动 / Inflight Start: 875

所有型号都审定了起飞状态下瞬时排出燃气温度超限 5°C、最长超限时间为 30 秒的状态。参考“特殊运行说明”文件。

All models are certified for a transitory exhaust gas temperature (EGT) exceedance at take-off of 5°C, during 30 seconds maximum. Refer to the applicable "Specific Operating Instructions" document.

1.2 滑油温度(°C) / Oil Temperature (°C)

启动时最小温度: 负 29 (不适用于 LEAP-1A S/B 72-0034, S/B 72-0035, S/B 72-0036 的 LEAP-1A 发动机。)

Minimum for starting: minus29 (LEAP-1A engines not compliant with LEAP-1A S/B 72-0034, S/B 72-0035, S/B 72-0036 and LEAP-1C..G01)

启动时最小温度: 负 40 (适用于 LEAP-1A S/B 72-0034, S/B 72-0035, S/B 72-0036 的 LEAP-1A 发动机。)

Minimum for starting: minus40 (LEAP-1A engines compliant with LEAP-1A S/B 72-0034, S/B 72-0035, S/B 72-0036 and LEAP-1C..G02)

加速到起飞推力时的最小温度: 19

Minimum for acceleration to take-off power: 19

最大稳态工况: 140

Maximum steady state: 140

最大瞬态工况 (15 分钟) 155

Maximum transient (15 minutes): 155

1.3 燃油进入温度 (°C) / Fuel Inlet Temperature (°C)

最大稳态工况 / Maximum steady state: 55

1.4 发动机设备温度 / Engine Equipment Temperatures:

参考适用的“发动机安装手册”中关于发动机设备稳态和瞬态表面温度的限制。

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

2. 速度限制 / Speed Limits**2.1 最大转速 (rpm=转/分) / Maximum Rotational Speeds (rpm=revolutions per minute):**

低压转子 (N1):	3894	(101 % - 100 % N1 时为 3856 rpm)
Low pressure rotor (N1):	3894	(101 % - 100 % N1 is defined as 3856 rpm)
高压转子 (N2):	19391	(116.5 % - 100 % N2 时为 16645 rpm)
High pressure rotor (N2):	19391	(116.5 % - 100 % N2 is defined as 16645 rpm)

3. 压力限制 / Pressure Limits**3.1 燃油压力 / Fuel Pressure:**

最小 / Minimum: 345 hPa (压差 / differential pressure)

最大 / Maximum (LEAP-1A): 4137 hPa (压差 / differential pressure)

在正常运行条件下, 发动机运转时, 燃油泵进口压力必须比气液比为零情况下真实蒸气压力值高 345hPa。

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 滑油压力 / Oil Pressure:

慢车条件下最小值: 1200 hPa (压差)

Minimum at Idle conditions: 1200 hPa (differential pressure)

最大连续条件下最小值: 2000 hPa (压差)

Minimum at Maximum Continuous conditions: 2000 hPa (differential pressure)

当发动机运转时, 滑油压力随高压转子转速变化而变化 (参考适用的发动机安装手册)。滑油压力低于最小值时发动机禁止运转。但是, 飞机的“负加速度”状态可能造成短时的滑油中断。只有在“负加速度”运行情况下, 允许发动机在停车前低于最小滑油压力运行最长 14 秒。

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 14 seconds before engine shutdown is required.

4. 限时放行 / Time Limited Dispatch (TLD)

发动机的限时放行按照 CS-E 1030 要求批准。每个放行状态的最大整改时间在适用的“发动翻修手册”第 5 章“适航限制”部分有详细规定。

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. 双发延程飞行能力 / ETOPS Capability

按照 CS-E 1040 第 3 修正案，对于符合 CFM 服务通告 LEAP-1A-71-00-0006 的 LEAP-1A 发动机，EASA 批准了最长 180 分钟最大连续推力加 15 分钟保持推力的转场时间(EASA 10062224 证书, 2017 年 6 月 16 日)。除非服务通告要求，双发延程飞行不需要任何特殊的发动机限制、标记、标牌或构型。这项批准不构成对双发延程飞行运行的批准。

When compliant with CFM service bulletin LEAP-1A-71-00-0006, the LEAP-1A engine is approved for ETOPS capability in accordance with CS-E 1040 amendment 3 by EASA Certificate 10062224 dated 16 June 2017 for a Maximum Approved Diversion Time of 180 minutes at maximum continuous thrust plus 15 minutes at hold thrust. ETOPS does not require any special engine limitation, marking, placard, or configuration other than as instructed by the service bulletin. This approval does not constitute an approval to conduct ETOPS operations.

V. 操作及服务说明/Operating and Service Instructions

手册 – LEAP-1A Manuals - LEAP-1A	
涡扇发动机安装手册 (EIM) Turbofan Engine Installation Manual (EIM)	LEAP-1A..G01: CRL-2106a Issue 01 (IM.20) LEAP-1A..G02, G03, G04, G05, G06, G07: CRL-2106a_3 Issue 05 (IM.20.3)
安装图纸 Installation Drawing	LEAP-1A..G01: CRL-2107a LEAP-1A..G02: CRL-2107a_1 LEAP-1A..G03: CRL-2107a_2 LEAP-1A..G04: CRL-2107a_3 Issue 00 LEAP-1A..G05: CRL-2107a_4 Issue 00 LEAP-1A..G06: CRL-2107a_5 Issue 00 LEAP-1A..G07: CRL-2107a_6 Issue 00
特殊运行说明 (SOI) Specific Operating Instructions (SOI)	CRL-2105a Revision 5 (GEK 131717)

或更新的批准版本/ Or later approved Issues or Revisions

持续适航文件 (ICA) Instructions for Continued Airworthiness (ICA)	LEAP-1A
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维修手册 Maintenance Manual	见飞机维修手册(AMM) See Aircraft Maintenance Manual (AMM)
故障隔离手册 Fault Isolation Manual	见飞机故障隔离手册(FIM) See Aircraft Fault Isolation Manual (FIM)
发动机翻修手册 (ESM) Engine Shop Manual (ESM)	SM.20
标准施工手册 (SPM) Standard Practices Manual (SPM)	SPM.25
耗材产品手册 (CPM) Consumable Product Manual (CPM)	CPM.25
无损检测手册 (NDTM) Non Destructive Test Manual (NDTM)	NDTM.25
部件维修手册 (CMM) Components Maintenance Manuals (CMM)	以 CFM 出版为准 As published by CFM
服务通告 (SB) Service Bulletins (SB)	以 CFM 出版为准 As published by CFM

VI. 注释/Notes

1. EASA 批准的持续适航文件的适航限制章节，见适用的“发动机翻修手册”第五章“适航限制”。
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. 发动机额定值是在校准的试车台性能基础上得到的，性能计算是基于可接受的参数修正方法得到的，参数修正方法在“产品测试要求”文件中有记载。这些计算假设条件如下：

- “产品测试要求”中定义的海平面拐点条件；
- 无飞机附件功率提取或者引气；
- 无防冰；无进气畸变；无进气道滤网损失；100%冲压恢复；
- 产品发动机进气道和产品排气系统；

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. 结合限制条件，起飞推力不能连续使用超过 5 分钟。当安装多台发动机的飞机发动机失效时，这个时间可以延长到 10 分钟，本次使用应记录在发动机履历本上。

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. 作为型号合格证持有人，CFM 国际由赛峰发动机公司（法国）和通用电气公司（美国）共同组成。CFM 国际负责本项目适航取证工作、销售及客户支持活动。经 CFM 国际授权赛峰发动机和通用电气具有依据型号合格证生产发动机的权利。发动机的最终组装地点标记在发动机铭牌上。在通用电气

气（美国）和在赛峰发动机（法国）生产的发动机完全相同，并且可以完全互换。

The type certificate holder, CFM International, is a company jointly owned by Safran Aircraft Engines (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, Safran Aircraft Engines and GE act as licensees of CFM International. The engine final assembly location is recorded on the engine identification plate. Engines produced by GE (USA) are identical to, and fully interchangeable with, engines produced by Safran Aircraft Engines (France).

5. LEAP-1A 发动机被批准使用埃赛公司的反推系统：左半边反推件号为 P/N BDL0011-12-0、右半边反推件号为 P/N BDL0051-12-0。

The LEAP-1A engine is approved for use with 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.

6. 发动机型号清单包含的构型组编号表明了以下发动机构型之间的差异：

The engine model list contains a configuration group number to differentiate between the following engine configurations:

构型组 Configuration Group	LEAP-1A 描述 LEAP-1A - Description
G01	最初发布的带有铝制风扇框架外罩（FFS）的构型 Initial release configuration with aluminium Fan Frame Shroud (FFS)
G02	最初发布的带有钛制风扇框架外罩（FFS）的构型 Initial release configuration with titanium FFS
G03	钛制风扇框架外罩，增加 FADEC 电子风扇防火功能，软件版本 L1A0250（10058742 证书） Titanium FFS, increased FADEC electrical fan fire protection, and software version L1A0250 (certificate 10058742)
G04	钛制风扇框架外罩，单级调节涡轮冷却活门（MTC），软件版本 L1A0310（10061124 证书） Titanium FFS, single Modulated Turbine Cooling (MTC) valve, and software version L1A0310 (certificate 10061124)
G05	钛制风扇框架外罩，新低压压气机（LPC），软件版本 L1A0310（10061530 证书） Titanium FFS, new Low Pressure Compressor (LPC), and software version L1A0310 (certificate 10061530)
G06	钛制风扇框架外罩，新低压压气机（LPC），垫片 SIN KA619 P/N 362-232-901-0 在主单元体 1（MM1）零件列表中（10063050 R1 证书） Titanium FFS, new Low Pressure Compressor (LPC), with shim SIN KA619 P/N 362-232-901-0 in the Major Module 1 (MM1) part list (certificate 10063050 R1)
G07	与上面相同，重新调整了启动引气活门（SBV）、低压压气机防冰（BAI）和瞬态放气活门（TBV）的位置（10063617 证书） Same as above, with Start Bleed Valve (SBV) / Booster Anti-Ice (BAI) and Transient Bleed Valve (TBV) Valves Relocation (certificate 10063617)

7. 发动机型号特性说明 / ENGINE MODEL CHARACTERISTICS

型号合格证数据单中所列的发动机型号，具有以下特性 The models shown on this TCDS have the following general characteristics	
LEAP-1A	
LEAP-1A35 A	适用于 A321neo，带有高海拔条件下的额外起飞推力。 A321neo Configuration, with additional takeoff thrust at high altitude
LEAP-1A33	具有更高推力额定值，其余与 LEAP-1A30 相同。 Same as LEAP-1A30, except for higher thrust rating.
LEAP-1A33 B2	具有额外飞行员可选起飞推力能力，其余与 LEAP-1A33 相同。 Same as LEAP-1A33, except for additional pilot-selected takeoff thrust
LEAP-1A32	具有更高推力额定值，其余与 LEAP-1A30 相同。 Same as LEAP-1A30, except for higher thrust rating.
LEAP-1A30	适用于 A321neo。 A321neo Configuration.
LEAP-1A26	适用于 A320neo。 A320neo Configuration
LEAP-1A26 E1	具有延伸环境温度起飞推力能力，其余与 LEAP-1A26 相同。 Same as LEAP-1A26, except for extended ambient temperature takeoff thrust capability.
LEAP-1A24	具有更高推力额定值，其余与 LEAP-1A23 相同。 Same as LEAP-1A23, except for higher thrust rating.
LEAP-1A24 E1	具有延伸环境温度起飞推力能力，其余与 LEAP-1A24 相同。 Same as LEAP-1A24, except for extended ambient temperature takeoff thrust capability.
LEAP-1A23	适用于 A319neo。 A319neo Configuration.

SECTION: ADMINISTRATIVE

其他部分

I. 缩写词与缩略语/Acronyms and Abbreviations

无 / n/a

II. 型号合格证持有人记录/Type Certificate Holder Record

无 / n/a

III. 更改记录/Change Record

型号合格证数据单版本 TCDS Issue	日期/Date	更改/Changes	TC 发布日期 TC issue date
第 01 版 Issue 01	2015 年 11 月 20 日 20 November 2015	首版, 包含 LEAP-1A35A 型号。 Initial issue with LEAP-1A35A model.	首版, 2015 年 11 月 20 日 Initial Issue, 20 November 2015
第 02 版 Issue 02	2016 年 3 月 11 日 11 March 2016	增加以下型号: LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26E1, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2。 Addition of LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26E1, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2 models.	修订, 2016 年 3 月 11 日 Amended, 11 March 2016

第 03 版 Issue 03	2016 年 7 月 11 日 11 July 2016	在批准特殊运行说明 (SOI CRL-2105a/Rev. 2) 和发动机安装手册 (EIM CRL-2106a_1 Issue 2/Rev.1) (10058275 证书) 之后, 修正了 LEAP-1A 发动机 LEAP- 1A..G02 构型的发动机重量, 修订了启动时和加速到起飞推力时的最小滑油温度, 修改了注 5。在型号清单中加入 LEAP-1A..G03 构型 (10058742 证书)。公司名称由斯奈克玛更改为赛峰发动机。 Following approval of SOI CRL-2105a/Rev. 2 and EIM CRL-2106a_1 Issue 2/Rev.1 (certificate 10058275), correction of LEAP-1A LEAP- 1A..G02 engine weight, amendment of minimum oil temperature for starting and for acceleration to take-off power, correction of note 5. Introduction of model list LEAP-1A..G03 (certificate 10058742). Snecma becomes Safran Aircraft Engines.	2016 年 3 月 11 日 11 March 2016
第 04 版 Issue 04	2016 年 12 月 21 日 21 December 2016	增加 LEAP-1C28、LEAP-1C30、LEAP-1C30B1 型号。修订了启动时和加速到起飞推力时的最小滑油温度 (10059856 证书)。 Addition of LEAP-1C28, LEAP-1C30, LEAP-1C30B1 models. Amendment of minimum oil temperature for starting and for acceleration to take-off power (certificate 10059856).	修订, 2016 年 12 月 21 日 Amended, 21 December 2016
第 05 版 Issue 05	2017 年 6 月 16 日 16 June 2017	在型号清单中加入 LEAP-1A..G04 构型 (10061124 证书) 和 LEAP- 1A..G05 构型 (10061530 证书)。批准了 LEAP-1A 发动机双发延程飞行能力 (10062224 证书)。修订注 4。增加注 6。 Introduction of model list LEAP-1A..G04 (certificate 10061124) and model list LEAP- 1A..G05 (certificate 10061530). LEAP-1A engine ETOPS capability approval (certificate 10062224). Amendment of note 4. Addition of note 6.	2016 年 12 月 21 日 21 December 2016

第 06 版 Issue 06	2017 年 11 月 2 日 02 November 2017	在型号清单中加入 LEAP-1A..G06 构型 （10063050 R1 证书） 和 LEAP- 1A..G07 构型 （10063617 证书）。 Introduction of model list LEAP-1A..G06 (certificate 10063050 R1) and model list LEAP- 1A..G07 (certificate 10063617).	2016 年 12 月 21 日 21 December 2016
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