

## 型号认可证数据单

THE VALIDATION DATA SHEET

编号/No: VTC0348E  
版次/Revision: 4  
型号/Type: LEAP-1A&LEAP-1C  
型别/Model:  
LEAP-1A23  
LEAP-1A24  
LEAP-1A24E1  
LEAP-1A26  
LEAP-1A26E1  
LEAP-1A30  
LEAP-1A32  
LEAP-1A33  
LEAP-1A33B2  
LEAP-1A35A  
LEAP-1C28  
LEAP-1C30  
LEAP-1C30B1  
LEAP-1A26CJ  
LEAP-1A29  
LEAP-1A29CJ

批准人/Approved By:



职务/Title: Deputy Director General

日期/Date: 2025-05-19

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 part of Validation of Type Certificate (No:VTC0348E), prescribes condition and limitation 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, S.A.  
2, Boulevard Du General Valin,  
75015, Paris,  
France

## 第1部分概述（所有型别） SECTION 1 General（ALL MODELS）

### 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<br>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<br>Type Certificate Data Sheet Number, Revision and issuance date   |
| 当前<br>Current | VTC0348E, 版次4, 2025年5月19日;<br>No. VTC0348E, Revision 4, May 19, 2025                   | EASA TCDS No.E.110, 第12版, 2023年11月24日<br>EASA TCDS No.E.110, Revision12, Nov.24, 2023 |
| 历史<br>History | VTC0348E, 版次3, 2023年3月24日;<br>No. VTC0348E, Revision 3, March 24, 2023                 | EASA TCDS No.E.110, 第11版, 2022年12月5日<br>EASA TCDS No.E.110, Revision 11, Dec. 5, 2022 |
|               | VTC0348E, 版次2, 2022年5月13日;<br>No. VTC0348E, Revision 2, May 13, 2022                   | EASA TCDS No.E.110, 第9版, 2020年12月20日<br>EASA TCDS No.E.110, Revision 9, Dec. 20, 2019 |
|               | VTC0348E, 版次1, 2020年2月17日;<br>No. VTC0348E, Revision 1, February 17, 2020              | EASA TCDS No.E.110, 第9版, 2020年12月20日<br>EASA TCDS No.E.110, Revision 9, Dec. 20, 2019 |
|               | VTC0348E, 版次0, 2018年3月30日;<br>No. VTC0348E, Revision 0, March 30, 2018                 | EASA TCDS No.E.110, 第6版, 2017年11月2日<br>EASA TCDS No.E.110, Revision 6, Nov. 02, 2017  |

注：上表中出口国局方型号合格证数据单信息仅供参考/Note: Above TCDS information of Certification Authority is only for reference.

### CAAC 认可数据单修订情况说明 / CAAC VTCDS Change Record

| CAAC 认可数据单版次/<br>CAAC VTCDS Revision | 相对上一版次的修订情况/<br>CAAC VTCDS Change Record                                                                                                                                                                                                                                                          | 备注/<br>Remark |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Rev 4                                | 1. 在III 2节中删除了LEAP-1C转换O型罩的特定零件号，并替换为通用零件号。<br>Removal of specific part numbers for LEAP-1C Translating O-duct and replaced with generic part numbers in section III 2.<br>2. 更新上一版的笔误。<br>Update the written error in last version.                                                              |               |
| Rev 3                                | 1. 更改了LEAP-1C发动机地面起动的排气温度限制。<br>Change in LEAP-1C ground start EGT limit.<br>2. 针对LEAP-1C..G04构型增加了涡轮风扇发动机安装手册。<br>Addition of the Turbofan Engine Installation Manual for model list LEAP-1C..G04 (certificate 10076935).<br>3. 修订了LEAP-1C发动机持续适航文件的列表。<br>Amendment of the LEAP-1C list of ICA. |               |

|       |                                                                                                                                                                                                                                                                             |  |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|       | 4.更改了环境保护要求。符合CS-E 34部和国际民航组织关于CAEP/11 nvPM的排放要求。<br>Change in Environmental Protection requirements. Compliance with CS-E 34 amendment 4 and ICAO CAEP/11 nvPM Emissions Standards.                                                                                        |  |
| Rev 2 | 1. 更新了“3号喷气燃料”国家标准（GB6537）<br>National Standard of “No.3 Jet Fuel”（GB6537） has been updated<br>2.增加LEAP-1C28, LEAP-1C30, LEAP-1C30B1, LEAP-1A26CJ, LEAP-1A29, LEAP-1A29CJ 型号/<br>Addition of LEAP-1C28, LEAP-1C30, LEAP-1C30B1, LEAP-1A26CJ, LEAP-1A29, LEAP-1A29CJ models. |  |

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: 欧盟航空安全局/EASA
4. 型号合格证持有人:  
Type Certificate Holder: CFM International, S.A.  
2, boulevard du Général Martial Valin  
75015 Paris  
France
5. ETOPS: 适用/Applicable
6. CAAC 专用要求/Special Requirements: 中华人民共和国国家标准“3号喷气燃料”（GB 6537）；  
National Standard of the People's Republic of China  
“No.3 Jet Fuel”（GB 6537）.

## 第2部分 SECTION 2

### I. 概述/ General

#### 1. 型号/Type/Models

|                   |                                                                                                                                                                                                     |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LEAP-1A & LEAP-1C | LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26E1,<br>LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2, LEAP-1A35A,<br>LEAP-1A26CJ, LEAP-1A29, LEAP-1A29CJ<br>LEAP-1C28, LEAP-1C30, LEAP-1C30B1 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 2. 型号合格证持有人/Type Certificate Holder

CFM International, S.A.

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<br>生产组织批准 FR.21G.0007<br>Production Organisation Approval<br>FR.21G.0007<br>10 allée du Brévent - CE 1420 -<br>Courcouronnes<br>91019 Evry Cedex<br>France | 通用电气/GE<br>生产许可证 No. 108<br>Production Certification No. 108<br>One Neumann Way<br>Cincinnati - Ohio 45215<br>United States of America |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|

(见注 4) / (See note 4)

#### 4. 申请日期/Date of Application

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

|                                     |                                     |
|-------------------------------------|-------------------------------------|
| LEAP-1C28, LEAP-1C30, LEAP-1C30B1   | 2015 年 12 月 1 日<br>01 December 2015 |
| LEAP-1A26CJ, LEAP-1A29, LEAP-1A29CJ | 2017 年 7 月 26 日<br>26 July 2017     |

## 5. EASA 颁证日期/EASA Type Certification Date

|                                                                                                         |                                      |
|---------------------------------------------------------------------------------------------------------|--------------------------------------|
| LEAP-1A35A                                                                                              | 2015 年 11 月 20 日<br>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<br>11 March 2016     |
| LEAP-1C28, LEAP-1C30, LEAP-1C30B1                                                                       | 2016 年 12 月 21 日<br>21 December 2016 |
| LEAP-1A26CJ, LEAP-1A29, LEAP-1A29CJ                                                                     | 2018 年 5 月 30 日<br>30 May 2018       |

## 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 LEAP-1A23, LEAP-1A24, LEAP-1A24E1, LEAP-1A26, LEAP-1A26E1, LEAP-1A30, LEAP-1A32, LEAP-1A33, LEAP-1A33B2, LEAP-1A26CJ, LEAP-1A29, LEAP-1A29CJ, LEAP-1C28, LEAP-1C30, LEAP-1C30B1. | <p>2021/011/R 确定的 CS-34 第四修正案 (2021 年 7 月 25 日)。</p> <p>适用 ICAO 附件 16, 卷 2, 第 10 版, 2021 年 1 月 1 日 (欧盟 2021 年 4 月 27 日立法)。</p> <ul style="list-style-type: none"> <li>• 氮氧化物的标准与 ICAO 附件 16, 卷 2, 第三部分第 2 章第 2.3.2 条 e)2)i) 款 (CAEP/8) 一致。</li> <li>• 碳氢和一氧化碳标准与 ICAO 附件 16, 卷 2, 第三部分第 2 章第 2.3.2 条一致。</li> <li>• 最大 nvPM 质量浓度的标准与第三部分第 4 章第 4.2.2.1 条一致。nvPM 排放的质量和数量应与第三部分第 4 章第 4.2.2.2 条的 a) 1) 款和 b) 1) 款一致 (CAEP/11 在产发动机标准)。</li> </ul> <p>CS-34 Amendment 4 as implemented by ED Decision 2021/011/R (applicable 25 July 2021), ICAO Annex 16 Volume II, Amendment 10 applicable 1 January 2021 as implemented into EU legislation 27 April 2021.</p> <ul style="list-style-type: none"> <li>• NOx standards in accordance with ICAO Annex 16 Volume II, Part III, Chapter 2, § 2.3.2 e)2)i) (CAEP/8).</li> <li>• HC, CO standards in accordance with ICAO Annex 16 Volume II, Part III, Chapter 2, § 2.3.2.</li> <li>• Maximum nvPM mass concentration levels in compliance with Part III, Chapter 4, paragraph 4.2.2.1. nvPM mass and number emissions in compliance with Part III, Chapter 4, paragraph 4.2.2.2 a) 1) and 4.2.2.2 b) 1) (CAEP/11 In-Production standard).</li> </ul> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**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-1A26CJ, LEAP-1A29, LEAP-1A29CJ. | <p>LEAP-1AxxGyy</p> <p>xx 表示型号额定值</p> <p>xx denotes model rating</p> <p>yy 表示型号构型组号码</p> <p>yy denotes model configuration group number</p> <p>参考最新版 CFM 服务通告 LEAP-1A 72-0220</p> <p>Refer to the latest revision of</p> <p>CFM Service Bulletin LEAP-1A 72-0220</p> |

| LEAP-1A     | 发动机识别塞编号<br>Engine identification plug reference | LEAP-1A     | 发动机识别塞编号<br>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                                       |
| LEAP-1A26CJ | 2531M61P46                                       | LEAP-1A29   | 2531M61P26                                       |
| LEAP-1A29CJ | 2531M61P42                                       | -           | -                                                |

| LEAP-1C                           | 发动机型号清单 / Engine model list                                                                                                                                                                                                                                          |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LEAP-1C28, LEAP-1C30, LEAP-1C30B1 | <p>LEAP-1CxxGyy</p> <p>xx 表示型号额定值</p> <p>xx denotes model rating</p> <p>yy 表示型号构型组号码</p> <p>yy denotes model configuration group number</p> <p>参考最新版 CFM 服务通告 LEAP-1C 72-0007</p> <p>Refer to the latest revision of</p> <p>CFM Service Bulletin LEAP-1C 72-0007</p> |

| LEAP-1C   | 发动机识别塞编号<br>Engine identification plug<br>reference | LEAP-1C     | 发动机识别塞编号<br>Engine identification plug<br>reference |
|-----------|-----------------------------------------------------|-------------|-----------------------------------------------------|
| LEAP-1C28 | 2531M61P30                                          | LEAP-1C30B1 | 2531M61P23                                          |
| LEAP-1C30 | 2531M61P22                                          | -           | -                                                   |

## 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)

LEAP-1C 发动机型号合格证包括反推装置。该反推装置由包括数字反推控制单元(TRCU)的电子反推作动系统 (ETRAS)驱动。

左侧发动机反推装置包括一个转换的 O 型罩 SIN 95000, 适用的零件编号为 BCL0005-04-0 及之后的编号。

右侧发动机反推装置包括一个转换的 O 型罩 SIN 95000, 适用的零件编号为 BCL0006-04-0 及之后的编号。

The LEAP-1C engine Type Certificate includes the thrust reverser. This thrust reverser is actuated by an Electrical Trust Reverser Actuation System (ETRAS) including a digital Thrust Reverser Control Unit (TRCU).

The left-hand engine thrust reverser includes a translating O-duct SIN 95000 with applicable Part numbers BCL0005-04-0 and up.

The right-hand engine thrust reverser includes a translating O-duct SIN 95000 with applicable Part numbers BCL0006-04-0 and up.

## 3. 设备 / Equipment

发动机起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 及以上<br>LEAP-1A..G02 and up | LEAP-1C..G01 及以上<br>LEAP-1C..G01 and up |
|--------------------------------------------------------------------------------------------|--------------|-----------------------------------------|-----------------------------------------|
| 长度（风扇机匣前安装边到涡轮后机匣后安装边）<br>Length(fan case forward flange to turbine rear frame aft flange) | 3328         | 3328                                    | -                                       |
| 长度（风扇罩连接梁前端到中心通风口后端）<br>Length (fan cowl hinge beam front to centre vent tube end)         | -            | -                                       | 4505                                    |
| 宽度（最大轮廓线）<br>Width(maximum envelope)                                                       | 2543         | 2533                                    | 2659                                    |
| 高度（最大轮廓线）<br>Height (maximum envelope)                                                     | 2368         | 2362                                    | 2714                                    |

**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 及以上<br>LEAP-1A..G02 and up | LEAP-1C..G01 | LEAP-1C..G02 及以上<br>LEAP-1C..G02 and up |
|------------------------------------------------------------------------------|--------------|-----------------------------------------|--------------|-----------------------------------------|
| 包括流体（滑油、燃油）<br>With fluids (oil, fuel)                                       | 2990         | 3008                                    | -            | -                                       |
| 不包括流体（滑油、燃油），包括反推装置<br>Without fluids (oil, fuel), including thrust reverser | -            | -                                       | 3935         | 3929                                    |

**6. 额定值 / Ratings**

| LEAP-1A23 | LEAP-1A24<br>LEAP-1A24E1 | LEAP-1A26<br>LEAP-1A26E1<br>LEAP-1A26CJ | LEAP-1A29<br>LEAP-1A29CJ | LEAP-1A30<br>LEAP-1A32<br>LEAP-1A33<br>LEAP-1A33B2<br>LEAP-1A35A |
|-----------|--------------------------|-----------------------------------------|--------------------------|------------------------------------------------------------------|
| 10680     | 10680                    | 12064                                   | 13029                    | 14305                                                            |

| LEAP-1A - 最大连续推力 / LEAP-1A-MaximumContinuousThrust (大牛/daN) |                          |                                                                  |                                                                  |
|-------------------------------------------------------------|--------------------------|------------------------------------------------------------------|------------------------------------------------------------------|
| LEAP-1A23                                                   | LEAP-1A24<br>LEAP-1A24E1 | LEAP-1A26<br>LEAP-1A26E1<br>LEAP-1A26CJ LEAP-1A29<br>LEAP-1A29CJ | LEAP-1A30<br>LEAP-1A32<br>LEAP-1A33<br>LEAP-1A33B2<br>LEAP-1A35A |
| 10458                                                       | 10676                    | 11868                                                            | 14096                                                            |

| LEAP-1C – 起飞推力 / LEAP-1C-Take-Off Thrust (大牛/daN) |                          |   |   |
|---------------------------------------------------|--------------------------|---|---|
| LEAP-1C28                                         | LEAP-1C30<br>LEAP-1C30B1 | - | - |
| 12998                                             | 13714                    | - | - |

| LEAP-1C – 最大连续推力/ LEAP-1C-Maximum Continuous Thrust (大牛/daN) |                          |   |   |
|--------------------------------------------------------------|--------------------------|---|---|
| LEAP-1C28                                                    | LEAP-1C30<br>LEAP-1C30B1 | - | - |
| 12793                                                        | 13322                    | - | - |

(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,<br>-1A24E1, -1A26,<br>-1A26E1, -1A30, -1A32,<br>-1A33, -1A33B2 | LEAP-1A26CJ, -<br>1A29,<br>-1A29CJ                                 |
| 工厂可加载软件件号<br>Factory Loadable Software P/N                   | 2500M34P03 | 2500M34P03                                                                       | 2500M34P03<br>2500M34P04<br>2500M34P05<br>2500M34P06<br>2500M34P08 |
| 应用软件件号<br>Application Software P/N                           | 2590M00P02 | 2590M00P03                                                                       | 2590M00P07                                                         |
| 健康监测软件件号<br>Health Monitoring Software P/N                   | 2590M01P01 | 2590M01P01                                                                       | n/a                                                                |
| 健康预测管理件号<br>Prognostic Health<br>Management P/N              | n/a        | n/a                                                                              | 2784M64P01                                                         |
| 开放式多媒体应用平台件号<br>Open Multimedia<br>Applications Platform P/N | n/a        | n/a                                                                              | 2590M01P05<br>2590M01P06                                           |
| 压力分系统（PSS）软件件号<br>Pressure Sub Systems (PSS) Software P/N    | 2474M65P05 | 2474M65P05                                                                       | 2474M65P05                                                         |

|                                            |                              |   |   |
|--------------------------------------------|------------------------------|---|---|
|                                            | LEAP-1C28, -1C30,<br>-1C30B1 | - | - |
| 工厂可加载软件件号<br>Factory Loadable Software P/N | 2500M35P03<br>2500M35P04     | - | - |

|                                                              |                                      |   |   |
|--------------------------------------------------------------|--------------------------------------|---|---|
| 应用软件件号<br>Application Software P/N                           | 2590M02P01                           | - | - |
| 健康监测软件件号<br>Health Monitoring Software P/N                   | 2590M03P01                           | - | - |
| 压力分系统（PSS）软件件号<br>Pressure Sub Systems (PSS)<br>Software P/N | 2474M65P05                           | - | - |
| TRCU 操作软件件号<br>TRCU Operating Software P/N                   | According to SCI<br>SK-0000492539-16 | - | - |
| TRCU 应用软件件号<br>TRCU Application Software P/N                 | 262074891-0230                       | - | - |

#### 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<br>Component                | 转动方向<br>Rotation<br>direction | 速度比/高压<br>转子<br>Speed ratio /<br>HP rotor | 最大功率或最<br>大扭矩<br>Max. power or<br>max. torque | 最大剪切扭矩<br>(米·大牛)<br>Max. shear<br>torque (m.daN) | 最大重量（湿<br>重）（公斤）<br>Max. weight<br>(wet)<br>(kg) | 最大悬挂扭矩<br>(米·大牛)<br>Max.<br>overhung<br>moment<br>(m.daN) |
| 发电机<br>Electrical<br>generator | CCW                           | 0.462                                     | 129 kW                                        | 106.2                                            | 65                                               | 11.3                                                      |

|                       |     |       |                     |    |      |     |
|-----------------------|-----|-------|---------------------|----|------|-----|
| 液压泵<br>Hydraulic pump | CCW | 0.211 | 14.7 米 • 大牛 / m.daN | 48 | 17.5 | 2.3 |
|-----------------------|-----|-------|---------------------|----|------|-----|

| LEAP-1C                     |                            |                                    |                                        |                                                 |                                          |                                                    |
|-----------------------------|----------------------------|------------------------------------|----------------------------------------|-------------------------------------------------|------------------------------------------|----------------------------------------------------|
| 部件<br>Component             | 转动方向<br>Rotation direction | 速度比/高压转子<br>Speed ratio / HP rotor | 最大功率或最大扭矩<br>Max. power or max. torque | 最大剪切扭矩<br>(米 • 大牛)<br>Max. shear torque (m.daN) | 最大重量 (湿重) (公斤)<br>Max. weight (wet) (kg) | 最大悬挂扭矩<br>(米 • 大牛)<br>Max. overhung moment (m.daN) |
| 发电机<br>Electrical generator | CCW                        | 1.066                              | 151 kW                                 | 86.6                                            | 65.2                                     | 13.9                                               |
| 液压泵<br>Hydraulic pump       | CW                         | 0.203                              | 14 米 • 大牛 / m.daN                      | 40.7                                            | 15.4                                     | 1.98                                               |

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 and LEAP-1C                       |                                           |                                           |
|-------------------------------------------|-------------------------------------------|-------------------------------------------|
| 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<br>Above minimum idle              | 二次流量的 2%<br>2% of secondary airflow       |
| 高压压气机第 4 级<br>HPC 4 <sup>th</sup> stage   | 高于最小慢车<br>Above minimum idle              | 主流流量的 9.97%*<br>9.97% of primary airflow* |
| 高压压气机第 7 级<br>HPC 7 <sup>th</sup> stage   | N1K 低于 2314 转/分**<br>Below 2314 rpm N1K** | 主流流量的 2.9%<br>2.9% of primary airflow     |
|                                           | N1K 高于 2314 转/分**<br>Above 2314 rpm N1K** | 主流流量的 2.45%<br>2.45% of primary airflow   |
| 高压压气机第 10 级<br>HPC 10 <sup>th</sup> stage | 高于最小慢车<br>Above minimum idle              | 主流流量的 15%<br>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 (测量值 750 – 针对 LEAP-1A S/B 73-0034 和 LEAP-1CS/B 73-0003 之前的发动机/ Measured 750 – Pre LEAP-1A S/B 73-0034 and pre LEAP-1C S/B 73-0003)  
750 (测量值 800 – 针对 LEAP-1A S/B 73-0034 和 LEAP-1C S/B 73-0003 之后的发动机 / Measured 800 – Post LEAP-1A S/B 73-0034 and post LEAP-1C S/B 73-0003)
- 空中启动 / Inflight Start: 875 (起动机辅助或稳态风车启动/ Starter assist or steady state windmill)  
920 (快速风车重起 / Quick windmill relight)  
970 (高功率燃油切断 / High power fuel cut)

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)

起动时最小温度: 负 29 (不适用于 LEAP-1A S/B 72-0034, S/B 72-0035, S/B 72-0036 的 LEAP-1A 发动机和 LEAP-1C G01 的 LEAP-1C 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)

起动时最小温度: 负 40 (适用于 LEAP-1A S/B 72-0034, S/B 72-0035, S/B 72-0036 的 LEAP-1A 发动机以及 LEAP-1C G02 及以上的 LEAP-1C 发动机。)

Minimum for starting: minus 40 (LEAP-1A engines compliant with LEAP-1A S/B 72-0034, S/B 72-0035, S/B 72-0036 and LEAP-1C..G02 and up)

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)

最大 / Maximum (LEAP-1C): 3800 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

LEAP 1A 发动机按照 CS-E 1040 第 3 修正案, 对于符合 CFM 服务通告 LEAP-1A 71-0006 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。

LEAP 1C 发动机没有按照 CS-E 1040 批准 ETOPS 能力。

LEAP-1A: When compliant with CFM service bulletin LEAP-1A 71-0006, 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.

LEAP-1C: The LEAP-1C engine is not approved for ETOPS capability in accordance with CS-E 1040.

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

| 手册- LEAP-1A<br>Manuals - LEAP-1A                             | 参考最新版 CFM 服务通告 LEAP-1A 72-0220<br>Refer to the latest revision of CFM Service Bulletin LEAP-1A 72-0220 |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 涡扇发动机安装手册 (EIM)<br>Turbofan Engine Installation Manual (EIM) | LEAP-1A..G01: CRL-2106a (IM.20)<br>LEAP-1A..G02 及以上: CRL-2106a_3 (IM.20.3)<br>LEAP-1A..G02 and up      |
| 安装图纸<br>Installation Drawing                                 | LEAP-1A..G01: CRL-2107a<br>LEAP-1A..G02 及以上: CRL-2107a_x<br>LEAP-1A..G02 and up                        |
| 特殊运行说明 (SOI)<br>Specific Operating Instructions (SOI)        | CRL-2105a (GEK 131717)                                                                                 |

| 手册- LEAP-1C<br>Manuals - LEAP-1C                             | 参考最新版 CFM 服务通告 LEAP-1C 72-0007<br>Refer to the latest revision of CFM Service Bulletin LEAP-1C 72-0007                |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 涡扇发动机安装手册 (EIM)<br>Turbofan Engine Installation Manual (EIM) | LEAP-1C..G01: CRL-2106c<br>LEAP-1C..G02: CRL-2106c_1<br>LEAP-1C..G03: CRL-2106c_2<br>LEAP-1C..G04 and up: CRL-2106c_3 |
| 安装图纸<br>Installation Drawing                                 | LEAP-1C..G01: CRL-2107c<br>LEAP-1C..G02 and up: CRL-2107c_x                                                           |
| 特殊运行说明 (SOI)<br>Specific Operating Instructions (SOI)        | LEAP-1C: CRL-2105c (GEK 131718)                                                                                       |

| 持续适航文件 (ICA)<br>Instructions for Continued<br>Airworthiness (ICA) | LEAP-1A                                                        | LEAP-1C                                                           |
|-------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------|
| 维修手册<br>Maintenance Manual                                        | 见飞机维修手册(AMM)<br>See Aircraft Maintenance<br>Manual (AMM)       | 见飞机维修手册(AMM)<br>See Aircraft Maintenance Manual<br>(AMM)          |
| 故障隔离手册<br>Fault Isolation Manual                                  | 见飞机故障隔离手册(FIM)<br>See Aircraft Fault Isolation<br>Manual (FIM) | 见飞机故障隔离手册(FIM)<br>See Aircraft Fault Isolation<br>Manual (FIM)    |
| 动力装置装配手册<br>Power Plant Build-up Manual<br>(PPBM)                 | n/a                                                            | PP.22                                                             |
| 结构修理手册<br>Structural Repair Manual                                | n/a                                                            | 见飞机结构修理手册 (SRM)<br>See Aircraft Structural Repair<br>Manual (SRM) |
| 发动机翻修手册 (ESM)<br>Engine Shop Manual (ESM)                         | SM.20                                                          | SM.22                                                             |
| 标准施工手册 (SPM)<br>Standard Practices Manual (SPM)                   | SPM.25                                                         | SPM.25                                                            |
| 耗材产品手册 (CPM)<br>Consumable Product Manual(CPM)                    | CPM.25                                                         | CPM.25                                                            |
| 无损检测手册 (NDTM)<br>Non Destructive Test<br>Manual(NDTM)             | NDTM.25                                                        | NDTM.25                                                           |
| 部件维修手册 (CMM)<br>Components Maintenance Manuals<br>(CMM)           | 以 CFM 出版为准<br>As published by CFM                              | 以 CFM 出版为准<br>As published by CFM                                 |
| 服务通告 (SB)<br>Service Bulletins (SB)                               | 以 CFM 出版为准<br>As published by CFM                              | 以 CFM 出版为准<br>As published by CFM                                 |

## VI. 注释/Notes

- 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".
- 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。为便于按照型号合格证生产发动机，赛峰发动机和通用电气经 CFM 国际授权生产发动机。发动机的最终组装地点标记在发动机铭牌上。在通用电气（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。LEAP-1C 发动机型号合格证包括反推装置。

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. The LEAP-1C engine Type Certificate includes the thrust reverser.

## 其他部分

## SECTION: ADMINISTRATIVE

**I. 缩写词与缩略语/Acronyms and Abbreviations**

CAAC 中国民用航空局/ Civil Aviation Administration of China

EASA 欧盟航空安全局 / European Union Aviation Safety Agency

n/a 不适用 / Not applicable

P/N 零件号 / Part number

S/B 服务通告 / Service Bulletin

SIN 重要项目编号 / Significant Item Number

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

无 / n/a

---结束---

---END---