

型号认可证数据单
THE VALIDATION DATA SHEET

编号/No: VTC0339E
版次/Revision: 4
型号/Type: LEAP-1B series engines
型别/Model:
LEAP-1B28
LEAP-1B28B2
LEAP-1B25
LEAP-1B27
LEAP-1B28B1
LEAP-1B28B3
LEAP-1B21
LEAP-1B23
LEAP-1B28BBJ1
LEAP-1B28BBJ2
LEAP-1B28B2C

批准人/Approved By:



职务/Title: Deputy Director General

日期/Date: 2025-06-19

本数据单是型号认可证（编号：VTC0339E）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: VTC0339E), 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 Martial Valin
75724 Paris Cedex 15
France

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	VTC0339E, 版次4, 2025年6月19日 VTC0339E, Revision 4, June 19, 2025	FAA TCDS No. E00088EN, 第6版, 2024年6月25日 FAA TCDS No. E00088EN, Revision 6, June 25, 2024
历史 History	VTC0339E, 版次3, 2024年1月30日 VTC0339E, Revision 3, January 30, 2024	FAA TCDS No. E00088EN, 第5版, 2019年11月4日 FAA TCDS No. E00088EN, Revision 5, November 4, 2019
	VTC0339E, 版次2, 2020年4月20日 VTC0339E, Revision 2, April 20, 2020	FAA TCDS No. E00088EN, 第5版, 2019年11月4日 FAA TCDS No. E00088EN, Revision 5, November 4, 2019
	VTC0339E, 版次1, 2018年8月10日 VTC0339E, Revision 1, August 10, 2018	FAA TCDS No. E00088EN, 第3版, 2018年5月30日 FAA TCDS No. E00088EN, Revision 3, May 30, 2018
	VTC0339E, 版次0, 2017年9月18日 VTC0339E, Revision 0, September 18, 2017	FAA TCDS No. E00088EN, 第2版, 2017年6月15日 FAA TCDS No. E00088EN, Revision 2, June 15, 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/ CAAC VTCDS Revision	相对上一版次的修订情况/ CAAC VTCDS Change Record	备注 Remark
版次 4/Rev 4	1.更新 14 CFR 第 34 部修正案 Update the amendment of 14 CFR Part 34 2.增加 CAAC 认可审定基础 Add the CAAC validation basis	
版次 3/Rev 3	1. 增加 CAAC 专用要求：燃油排泄和排气排排出物 CCAR-34-R1 Add CAAC Special Requirements: fuel venting and exhaust emissions requirements CCAR-34-R1 2.更改 CAAC 关于 3 号燃油专用要求表述 Changes of description of CAAC Special Requirements about “No.3 Jet Fuel”	本版本认可数据单对应的 FAA数据单版本与版次2 对应的FAA数据单版本一 致 VTCDS Rev 3 corresponds to the same FAA TCDS as VTCDS Rev 2

2. 类别/Category:

航空发动机/Aeroengine
3. 认可当局/Validation Authority:

中国民用航空局/CAAC

审定当局/Certifying Authority:

美国联邦航空管理局/FAA
4. 型号合格证持有人/Type Certificate Holder:

CFM International, S.A.
2 Boulevard du General Martial Valin
75724 Paris Cedex 15
France
5. ETOPS:

见注释 11/See Note 11
6. CAAC 专用要求/Special Requirements:

(1) 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)
(2) 燃油排泄和排气排出物规定 CCAR-34-R1
Fuel venting and exhaust emissions
requirements CCAR-34-R1

第2部分 数据单

SECTION 2 DATA SHEET

I. 型别/MODELS	LEAP-1B28	LEAP-1B28B2	LEAP-1B28B1	LEAP-1B28B3
类型/TYPE	高涵道比涡轮风扇发动机，多级低压涡轮驱动直接驱动前置风扇/增压级；多级压气机；两级高压涡轮；双环预旋燃烧室；全权限数字发动机控制（FADEC）。 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; twin annular pre swirl combustors; and a full authority digital engine control (FADEC).			
额定值/RATINGS	见注释 1/See Note 1.			
海平面静推力，磅(10 牛顿) Static Thrust at Sea Level, lb (daN)				
• 起飞/Takeoff (5 min.)	29,317 (13,041)	--	--	--
• 最大连续/Maximum continuous	28,690 (12,762)	--	--	--
平台额定海平面环境温度 °F (°C) Flat Rating Ambient Temperature at Sea Level °F (°C)				
• 起飞/Takeoff	86 (30)	--	--	--
• 最大连续/Maximum continuous	77 (25)	--	--	--
零件/COMPONENTS	件号/Part Number			
全权限数字控制（FADEC） Full Authority Digital Control (FADEC)				
• 电子控制单元 Electronic control unit	2474M64	--	--	--
• 压力子系统/PSS	2474M65,	--	--	--
• 软件/Software	2628M86,2628M87, 2628M88,2697M83	--	--	--
• 识别插头/Identification plug	2531M61P26	2531M61P28	2531M61P27	2531M61P29
燃油/FUEL	• 批准的燃料符合 GE 规范 D50TF2，A、C、D 和 E 级。主要燃料是 D50TF2 A 级（Jet A）与其他所列可接受燃油。当从主燃料转换为备用燃油时，不需要调节燃油控制。不允许使用航空汽油和 D50TF2 B 级燃油、宽馏分（JET B 或 JP-4）燃油。 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. • 参考最新服务通告 LEAP-1B S/B 73-0001 所列的 LEAP-1B 发动机批准使用的燃油。 Refer to the latest revision of CFM Service Bulletin LEAP-1B S/B 73-0001 for a list of fuels specifically approved for LEAP-1B engine.			
滑油/OIL	• 合成型滑油，符合 GE 规范 D50TF1，I 型和 II 型。 Synthetic type conforming to GE Specification D50TF1, Type I and Type II. • 参考最新服务通告 LEAP-1B S/B 79-0001 所列的 LEAP-1B 发动机批准使用的滑油。 Refer to the latest revision of CFM Service Bulletin LEAP-1B S/B 79-0001 for a list of oil specifically approved for the LEAP-1B engine.			
物理特性/PHYSICAL CHARACTERISTICS				

主要尺寸 PRINCIPLE DIMENSIONS	英寸(毫米) in (mm)			
长度/Length 前风扇机匣法兰至涡轮后导向器法兰 Fwd. fan case flange to TRV aft flange	123.9 (3147)	--	--	--
宽度/Width 最大轮廓/Maximum Envelope	95.31 (2421)	--	--	--
高度/Height 最大轮廓/Maximum Envelope	88.82 (2256)	--	--	--
重量/WEIGHT 不超过/Not to Exceed	发动机的重量根据发动机本体确定，包括基本发动机附件。 The engine weight is defined as the weight of the basic engine, including basic engine accessories 磅 (千克)/lb (kg)			
	6128 (2780)	--	--	--
重心位置 CENTER OF GRAVITY LOCATION 只包含发动机，标准重量 Engine Only, Nominal Weight	英寸(毫米) in (mm)			
站位(轴向)/Station (axial) 高压压气机机匣前法兰 = 200 英寸 (5080毫米) HPC case fwd flange = 200 in (5080 mm)	211.8 (5380.0)	--	--	--
水平线/Waterline	98.2 (2494)	--	--	--
纵剖线/Butt line	98.2 (2494)	--	--	--

II. 型别/MODELS	LEAP-1B27	LEAP-1B25
类型/TYPE	高涵道比涡轮风扇发动机，多级低压涡轮驱动直接驱动前置风扇/增压级；多级压气机；两级高压涡轮；双环预旋燃烧室；全权限数字发动机控制（FADEC）。 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; twin annular pre swirl combustors; and a full authority digital engine control (FADEC).	
额定值/RATINGS	见注释 1/See Note 1.	
海平面静推力，磅(10 牛顿) Static Thrust at Sea Level, lb (daN) • 起飞/Takeoff (5 min.) • 最大连续/Maximum continuous	28,037 (12,471) 27,272 (12,131)	26,786 (11,915) 25,958 (11,547)
平台额定海平面环境温度°F (°C) Flat Rating Ambient Temperature at Sea Level °F (°C) • 起飞/Takeoff • 最大连续/Maximum continuous	86 (30) 77 (25)	86 (30) 77 (25)
全权限数字控制（FADEC）	件号/Part Number	

Full Authority Digital Control (FADEC) • 电子控制单元 Electronic control unit • 压力子系统/PSS • 软件/Software • 识别插头/Identification plug	2474M64 2474M65 2628M86, 2628M87, 2628M88, 2697M83 2531M61P18	-- -- -- -- 2531M61P10
燃油/FUEL	• 批准的燃料符合 GE 规范 D50TF2, A、C、D 和 E 级。主要燃料是 D50TF2 A 级（Jet A）与其他所列可接受燃油。当从主燃料转换为备用燃油时，不需要调节燃油控制。不允许使用航空汽油和 D50TF2 B 级燃油、宽馏分（JET B 或 JP-4）燃油。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. • 参考最新服务通告 LEAP-1B S/B 73-0001 所列的 LEAP-1B 发动机批准使用的燃油。Refer to the latest revision of CFM Service Bulletin LEAP-1B S/B 73-0001 for a list of fuels specifically approved for LEAP-1B engine.	
滑油/OIL	• 合成型滑油，符合 GE 规范 D50TF1, I 型和 II 型。Synthetic type conforming to GE Specification D50TF1, Type I and Type II. • 参考最新服务通告 LEAP-1B S/B 79-0001 所列的 LEAP-1B 发动机批准使用的滑油。Refer to the latest revision of CFM Service Bulletin LEAP-1B S/B 79-0001 for a list of oil specifically approved for the LEAP-1B engine.	
物理特性/PHYSICAL CHARACTERISTICS		
主要尺寸 PRINCIPLE DIMENSIONS 长度/Length 前风扇机匣法兰至涡轮后导向器 法兰 Fwd. fan case flange to TRV aft flange 宽度/Width 最大轮廓/Maximum Envelope 高度/Height 最大轮廓/Maximum Envelope	英寸(毫米)/ in (mm) 123.9 (3147) 95.31 (2421) 88.82 (2256)	-- -- --
重量/WEIGHT 不超过/Not to Exceed	发动机的重量根据发动机本体确定，包括基本发动机附件。 The engine weight is defined as the weight of the basic engine, including basic engine accessories 磅 (千克)/lb (kg) 6128 (2780)	
重心位置 CENTER OF GRAVITY LOCATION 只包含发动机，标准重量 Engine Only, Nominal Weight 站位(轴向)/Station (axial) 高压压气机机匣前法兰 = 200 英寸 (5080毫米) HPC case fwd flange = 200 in (5080 mm) 水平线/Waterline 纵剖面/Butt line	英寸(毫米) in (mm) 211.8 (5380.0) 98.2 (2494) 98.2 (2494)	-- -- --

III. 型别/MODELS	LEAP-1B21	LEAP-1B23	LEAP-1B28B2C
类型/TYPE	高涵道比涡轮风扇发动机，多级低压涡轮驱动直接驱动前置风扇/增压级；多级压气机；两级高压涡轮；双环预旋燃烧室；全权限数字发动机控制（FADEC）。 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; twin annular pre swirl combustors; and a full authority digital engine control (FADEC).		
额定值/RATINGS	见注释 1/See Note 1.		
海平面静推力，磅(10 牛顿) Static Thrust at Sea Level, lb (daN) • 起飞/Takeoff (5 min.) • 最大连续/Maximum continuous 平台额定海平面环境温度°F (°C) Flat Rating Ambient Temperature at Sea Level °F (°C) • 起飞/Takeoff • 最大连续/Maximum continuous	25,014 (11,127) 24,054 (10,700) 86 (30) 77 (25)	25,907 (11,524) 25,012 (11,126) 86 (30) 77 (25)	28,037 (12,471) 27,272 (12,131) 86 (30) 77 (25)
全权限数字控制（FADEC） Full Authority Digital Control (FADEC) • 电子控制单元 Electronic control unit • 压力子系统/PSS • 软件/Software • 识别插头/Identification plug	件号/Part Number		
	2474M64 2474M65 2628M86, 2628M87, 2628M88, 2697M83 2531M61P02	-- -- -- -- 2531M61P06	-- -- -- -- 2531M61P24
燃油/FUEL	• 批准的燃料符合 GE 规范 D50TF2，A、C、D 和 E 级。主要燃料是 D50TF2 A 级（Jet A）与其他所列可接受燃油。当从主燃料转换为备用燃油时，不需要调节燃油控制。不允许使用航空汽油和 D50TF2 B 级燃油、宽馏分（JET B 或 JP-4）燃油。 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. • 参考最新服务通告 LEAP-1B S/B 73-0001 所列的 LEAP-1B 发动机批准使用的燃油。 Refer to the latest revision of CFM Service Bulletin LEAP-1B S/B 73-0001 for a list of fuels specifically approved for LEAP-1B engine.		
滑油/OIL	• 合成型滑油，符合 GE 规范 D50TF1，I 型和 II 型。 Synthetic type conforming to GE Specification D50TF1, Type I and Type II. • 参考最新服务通告 LEAP-1B S/B 79-0001 所列的 LEAP-1B 发动机批准使用的滑油。 Refer to the latest revision of CFM Service Bulletin LEAP-1B S/B 79-0001 for a list of oil specifically approved for the LEAP-1B engine.		
物理特性/PHYSICAL CHARACTERISTICS			

主要尺寸 PRINCIPLE DIMENSIONS	英寸(毫米)/ in (mm)		
长度/Length 前风扇机匣法兰至涡轮后导向器法兰 Fwd. fan case flange to TRV aft flange	123.9 (3147)	--	--
宽度/Width 最大轮廓/Maximum Envelope	95.31 (2421)	--	--
高度/Height 最大轮廓/Maximum Envelope	88.82 (2256)	--	--
重量/WEIGHT 不超过/Not to Exceed	发动机的重量根据发动机本体确定，包括基本发动机附件。 The engine weight is defined as the weight of the basic engine, including basic engine accessories 磅 (千克)/lb (kg)		
	6128 (2780)	--	--
重心位置 CENTER OF GRAVITY LOCATION 只包含发动机，标准重量 Engine Only, Nominal Weight	英寸(毫米) in (mm)		
站位(轴向)/Station (axial) 高压压气机机匣前法兰 = 200 英寸 (5080毫米) HPC case fwd flange = 200 in (5080 mm)	211.8 (5380.0)	--	--
水平线/Waterline	98.2 (2494)	--	--
纵剖线/Butt line	98.2 (2494)	--	--

IV. 型别/MODELS	LEAP-1B28BBJ1	LEAP-1B28BBJ2
类型/TYPE	高涵道比涡轮风扇发动机，多级低压涡轮驱动直接驱动前置风扇/增压级；多级压气机；两级高压涡轮；双环预旋燃烧室；全权限数字发动机控制（FADEC）。 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; twin annular pre swirl combustors; and a full authority digital engine control (FADEC).	
额定值/RATINGS	见注释 1/See Note 1.	
海平面静推力，磅(10 牛顿) Static Thrust at Sea Level, lb (daN) • 起飞/Takeoff (5 min.) • 最大连续/Maximum continuous	29,317 (13,041) 28,690 (12,762)	28,037 (12,471) 27,272 (12,131)
平台额定海平面环境温度°F (°C) Flat Rating Ambient Temperature at Sea Level °F (°C) • 起飞/Takeoff • 最大连续/Maximum continuous	86 (30) 77 (25)	86 (30) 77 (25)
全权限数字控制（FADEC） Full Authority Digital Control (FADEC) • 电子控制单元 Electronic control unit • 压力子系统/PSS • 软件/Software • 识别插头/Identification plug	件号/Part Number	
	2474M64 2474M65 2628M86, 2628M87, 2628M88, 2697M83 2531M61P14	-- -- -- -- 2531M61P30
燃油/FUEL	• 批准的燃料符合 GE 规范 D50TF2, A、C、D 和 E 级。主要燃料是 D50TF2 A 级（Jet A）与其他所列可接受燃油。当从主燃料转换为备用燃油时，不需要调节燃油控制。不允许使用航空汽油和 D50TF2 B 级燃油、宽馏分（JET B 或 JP-4）燃油。 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. • 参考最新服务通告 LEAP-1B S/B 73-0001 所列的 LEAP-1B 发动机批准使用的燃油。 Refer to the latest revision of CFM Service Bulletin LEAP-1B S/B 73-0001 for a list of fuels specifically approved for LEAP-1B engine.	
滑油/OIL	• 合成型滑油，符合 GE 规范 D50TF1, I 型和 II 型。 Synthetic type conforming to GE Specification D50TF1, Type I and Type II. • 参考最新服务通告 LEAP-1B S/B 79-0001 所列的 LEAP-1B 发动机批准使用的滑油。 Refer to the latest revision of CFM Service Bulletin LEAP-1B S/B 79-0001 for a list of oil specifically approved for the LEAP-1B engine.	
物理特性/PHYSICAL CHARACTERISTICS		

主要尺寸 PRINCIPLE DIMENSIONS 长度/Length 前风扇机匣法兰至涡轮后导向器 法兰 Fwd. fan case flange to TRV aft flange 宽度/Width 最大轮廓/Maximum Envelope 高度/Height 最大轮廓/Maximum Envelope	英寸(毫米)/ in (mm) 123.9 (3147) 95.31 (2421) 88.82 (2256)	-- -- --
重量/WEIGHT 不超过/Not to Exceed	发动机的重量根据发动机本体确定，包括基本发动机附件。 The engine weight is defined as the weight of the basic engine, including basic engine accessories 磅 (千克)/lb (kg) 6128 (2780)	--
重心位置 CENTER OF GRAVITY LOCATION 只包含发动机，标准重量 Engine Only, Nominal Weight 站位(轴向)/Station (axial) 高压压气机机匣前法兰 = 200 英寸 (5080毫米) HPC case fwd flange = 200 in (5080 mm) 水平线/Waterline 纵剖线/Butt line	英寸(毫米) in (mm) 211.8 (5380.0) 98.2 (2494) 98.2 (2494)	-- -- --

审定基础**CERTIFICATION BASIS**

1. 14 CFR 第33部, 1965年2月1日生效, 修正案 33-1 至33-33。
14 CFR Part 33, effective February 1, 1965, with Amendments 33-1 through 33-33 thereto.
2. 14 CFR 第34部, 7A修正案, 2024年5月24日生效。
14 CFR Part 34, Amendment 7A, effective May 24, 2024.
3. 排放: 国际民航组织 Annex 16, 第二卷, 修正案8 (CAEP/8) 最新修订。
Emissions: ICAO Annex 16, Vol. II, Amendment 8 (CAEP/8) latest change
4. 等效安全结论/ELOS
 - 针对14 CFR 33.27(c)条款的LEAP1B-2014-TC-01-P-1: 高压轴失去负载
LEAP1B-2014-TC-01-P-1 to 14 CFR 33.27(c): High Pressure Shaft Loss-of-Load
 - 针对14 CFR 33.77条款的LEAP1B-2014-TC-01-P-2: 外物吸入—冰
LEAP1B-2014-TC-01-P-2 to 14 CFR 33.77: Foreign object Ingestion – Ice
 - 针对14 CFR 33.83条款的LEAP1B-2014-TC-01-P-3: 振动试验
LEAP1B-2014-TC-01-P-3 to 14 CFR 33.83: Vibration Test
5. 专用条件/Special Conditions
 - 风扇叶片专用条件/Fan Blade Special Condition No. 33-017-SC
6. 豁免/Exemptions: 无/None

型别/MODEL	申请日期 APPLICATION DATE	型号合格证颁发/修订 TC ISSUED/AMENDED
LEAP-1B28	2013年5月9日/09 May 2013	2016年5月4日/04 May 2016
LEAP-1B28B2	2013年5月9日/09 May 2013	2016年5月4日/04 May 2016
LEAP-1B28B1	2016年10月27日/27 October 2016	2017年2月17日/17 February 2017
LEAP-1B28B3	2016年10月27日/27 October 2016	2017年2月17日/17 February 2017
LEAP-1B27	2016年10月27日/27 October 2016	2017年2月17日/17 February 2017
LEAP-1B25	2016年10月27日/27 October 2016	2017年2月17日/17 February 2017
LEAP-1B21	2018年2月27日/27 February 2018	2018年5月30日/30 May 2018
LEAP-1B23	2018年2月27日/27 February 2018	2018年5月30日/30 May 2018
LEAP-1B28B2C	2018年2月27日/27 February 2018	2018年5月30日/30 May 2018
LEAP-1B28BBJ1	2018年2月27日/27 February 2018	2018年5月30日/30 May 2018
LEAP-1B28BBJ2	2018年2月27日/27 February 2018	2018年5月30日/30 May 2018

**CAAC 认可审定基础/ CAAC
VALIDATION BASIS**

接受 FAA 的审定基础作为认可审定基础。
Accept FAA certification basis as validation basis.
附加技术条件/Additional Technical Requirement:
(1) 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)
(2) 燃油排泄和排气排出物规定 CCAR-34-R1, 详见注释 23a
Fuel venting and exhaust emissions requirements CCAR-34-R1, See NOTE 23a

生产依据**PRODUCTION BASIS**

生产许可证No. 108, GE根据CFMI, S.A.的许可在美国生产 (见注释16)。
Production Certificate No. 108 for engines produced in the United States by General Electric under license from CFM International, S.A. (See NOTE 16).
生产许可证No. FR.21G.0007, Safran根据CFMI, S.A.的许可在法国生产 (见注释16)。
Production Certification No. FR.21G.0007 dated December 17th, 2009 for engines produced in France by Safran under license from CFM International, S.A (See NOTE 16).

注释/NOTE

注释 1/NOTE 1.

发动机额定值/Engine Rating

发动机额定值基于以下条件的校准台架性能:

Engine rating is based on calibrated stand performance under the following conditions:

除非另有注解, 起飞推力名义上与环境温度(平台额定值)无关, 直至标准温度+15℃(30℃, 86℉)。

Takeoff thrust is nominally independent of ambient temperature (flat rated) up to ambient temperature of: Std+15℃ (30℃, 86℉), except as noted above.

最大连续推力名义上与环境温度(平台额定值)无关, 直至标准温度+10℃(25℃, 77℉)。

Maximum continuous thrust is nominally independent of ambient temperature (flat rated) up to ambient temperature of Std. +10℃ (25℃, 77℉).

假设/Assumptions

1. 海平面静止状态, 标准天气: 压力 101.325 kPa (14.696 psia); 温度 15℃ (59℉)
Sea level static, standard day: 101.325 kPa Pressure (14.696 psia); 15℃ temperature (59℉)
2. 零客户引气或功率提取/Zero customer bleed or customer horsepower extraction
3. 理想进气, 100%冲压恢复/Ideal inlet, 100% ram recovery
4. 生产型飞机飞行整流罩/Production aircraft flight cowl
5. 生产型传感设备/Production instrumentation
6. 燃油低热值 18,400 BTU/磅/Fuel lower heating value of 18,400 BTU/lb

推力设定参数/Thrust Setting Parameter

在所有运行中的功率设置、功率检查与发动机推力控制, 均基于参考风扇转速的 CFMI 发动机图表。为此目的, 发动机安装有风扇转速传感器。

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.

注释 2/NOTE 2.

温度限制/TEMPERATURE LIMITS

指示涡轮排气温度/Indicated Turbine Exhaust Gas Temperature ¹	
起飞, 5 分钟/Takeoff, 5 min	1038 ℃ (1900 ℉)
最大连续/Maximum Continuous	1013 ℃ (1855 ℉)
最大瞬态运行 (30 秒) /Max Transient (30 sec.)	1048 ℃ (1918 ℉)
地面起动/Ground Starts	753 ℃ (1387 ℉)
空中起动/Inflight Starts	883 ℃ (1621 ℉)
• 起动机辅助或稳态风车 Starter Assist or Steady State Windmill	920 ℃ (1688 ℉)
• 快速风车点火/Quick Windmill Relight	981 ℃ (1798 ℉)
• 高功率燃油切断/High Power Fuel Cut	
燃油泵进口温度/Fuel Pump Inlet Temperature	
最大/Maximum	54.5 ℃ (130 ℉)
最小 (冷启动) /Minimum (Cold Start)	-43 ℃ (-45 ℉) 或燃油冰点, 二者取高。 Or the relevant fuel freezing point, whichever is higher.
滑油温度/Oil Temperature	
最大/Maximum	140 ℃ (284 ℉)
• 连续运转/Continuous operation	155 ℃ (311 ℉)
• 瞬态 (15 分钟) /Transient (15 minutes)	
最小 (冷启动) /Minimum (Cold Start)	
• 未贯彻 LEAP-1B S/B 72-0011 的发动机 Engines Not Compliant with LEAP-1B S/B 72-0011	-19 ℃ (-2 ℉)
• 贯彻 LEAP-1B S/B 72-0011 的发动机 Engines Compliant with LEAP-1B S/B 72-0011	-40 ℃ (-40 ℉)

1 涡轮排气温度指示/EXHAUST GAS TEMPERATURE INDICATION

涡轮排气温度 (EGT=T48) 在低压涡轮进口处测量

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

型别/Model	指示涡轮排气温度 Indicated Turbine Exhaust Gas Temperature		最大涡轮排气温度限制 Maximum Exhaust Gas Temperature Limit	
			在贯彻服务通告 LEAP-1B 72-0169 之前/Pre-Service Bulletin LEAP-1B 72-0169	在贯彻服务通告 LEAP-1B 72-0169 之后/Post-Service Bulletin LEAP-1B 72-0169
LEAP-1B28, LEAP-1B28B2, LEAP-1B25, LEAP-1B27, LEAP-1B28B1, LEAP-1B28B3	起飞, 5 分钟 Takeoff, 5 min	1038°C (1900°F)	1038°C (1900°F)	1060°C (1940°F)
	最大连续 Maximum Continuous	1013°C (1855°F)	1013°C (1855°F)	1040°C (1904°F)
LEAP-1B21, LEAP-1B23, LEAP-1B28B2C, LEAP-1B28BBJ1, LEAP-1B28BBJ2	起飞, 5 分钟 Takeoff, 5 min	1038°C (1900°F)	不适用 N/A	1060°C (1940°F)
	最大连续 Maximum Continuous	1013°C (1855°F)	不适用 N/A	1040°C (1904°F)
LEAP-1B28, LEAP-1B28B2, LEAP-1B25, LEAP-1B27, LEAP-1B28B1, LEAP-1B28B3, LEAP-1B21, LEAP-1B23, LEAP-1B28B2C, LEAP-1B28BBJ1, LEAP-1B28BBJ2			在贯彻服务通告 LEAP-1B 73-0025 之前/Pre-Service Bulletin LEAP-1B 73-0025	在贯彻服务通告 LEAP-1B 73-0025 之后/Post-Service Bulletin LEAP-1B 73-0025
	地面起动 Ground Starts	753°C (1387°F)	753°C (1387°F)	800°C (1472°F)

所有型别在最大瞬态涡轮排气温度 (EGT) 超出起飞状态 10 °C 30 秒进行审定。

All models are certified for a max transient exhaust gas temperature (EGT) exceedance at take-off of 10 °C for 30 seconds maximum.

注释 3/NOTE 3.

燃油和滑油压力限制/FUEL AND OIL PRESSURE LIMITS

发动机进口处燃油压力限制/Fuel Pressure Limits At The Engine Pump Inlet
- 飞机增压泵工作时/Aircraft Boost Pump Operative 在飞机增压泵工作时, 发动机燃油泵进口处的最小压力为是真实蒸汽压力加 5 psia (34.5 kPa)。在飞机增压泵工作时, 发动机燃油泵入口处的最大气液比为零。 The minimum pressure at the engine fuel pump inlet with aircraft boost pumps operative is true vapor pressure plus 5 psia (34.5 kPa). The maximum vapor to liquid ratio at the engine fuel pump inlet with aircraft boost pumps operative is zero. - 飞机增压泵不工作时/Aircraft Boost Pump Inoperative 飞机增压泵不工作时, 发动机燃油系统操作由 LEAP-1B 安装手册的描述限制。 The engine fuel system operation is restricted with the aircraft boost pumps inoperative as outlined in the LEAP-1B Installation Manual.
滑油压力/Oil Pressure Limits
- 慢车时最小压力为 17.4 psid (120.0 kPa), 最高红线压力为 29 psid (200.0 kPa)。 The minimum pressure limit at idle is 17.4 psid (120.0 kPa) and varies up to 29 psid (200.0 kPa) at redline. - 冷起动时, 最大压力受 420.5 psid (2900 kPa 压差) 卸压阀限制。 The maximum pressure is limited during cold starts by a 420.5 psid (2900 kPa differential) pressure-relief valve.

注释 4/NOTE 4.

附件驱动特性/ACCESSORY DRIVE CHARACTERISTICS

电气 (IDG) */Electrical (IDG)*		
转向+/Rotation Direction+	马力 (千瓦) /HP (kW) 英寸-磅 (牛米) /in.lb (N.m) 英寸-磅 (牛米) /in.lb (N.m)	CCW
与核心机转速比**/Speed ratio to core**		0.418
额定值/Pad Rating		168 (125)
剪切力矩/Shear Torque		9408 (1063)
最大悬臂力矩 (湿) Maximum overhung moment (wet)		956 (108)
液压泵*/Hydraulic Pump*		
转向+/Rotation Direction+	英寸-磅 (牛米) /in.lb (N.m) 英寸-磅 (牛米) /in.lb (N.m) 英寸-磅 (牛米) /in.lb (N.m)	CCW
与核心机速比**/Speed ratio to core**		0.191
额定值/Pad Rating		1407 (159)
剪切力矩/Shear Torque		3602 (407)
		166 (18.8)

最大悬臂力矩 (湿) Maximum overhung moment (wet)		
*- 飞机提供的硬件/Airframer Supplied Hardware +-CW=顺时针 (面向驱动座) /CW=CLOCKWISE(looking at the Pad) **-100%核心机转速=17,167 转/分钟/100% core speed = 17,167 RPM		

注释 5/NOTE 5.

发动机型别特性/ENGINE MODEL CHARACTERISTICS

本数据单所列型别具有以下一般特征 The model shown on this TCDS has the following general characteristics	
LEAP-1B28	737MAX 8 构型。 737MAX 8 Configuration.
LEAP-1B28B2	与 LEAP-1B28 相同, 增加高原起飞推力。 Same as LEAP-1B28 with additional takeoff thrust at high altitude conditions.
LEAP-1B28B1	与 LEAP-1B28B2 相同, 此外修正高原起飞推力计划。 Same as LEAP-1B28B2 with revised takeoff thrust schedule at high altitude conditions.
LEAP-1B28B3	与 LEAP-1B28B2 相同, 此外修正低海拔条件下的起飞推力计划。 Same as LEAP-1B28B2 with revised takeoff thrust schedule at low altitude conditions.
LEAP-1B27	除降低推力额定值外, 与 LEAP-1B28 相同。 Same as LEAP-1B28 except for lower thrust rating.
LEAP-1B25	除降低推力额定值外, 与 LEAP-1B28 相同。 Same as LEAP-1B28 except for lower thrust rating.
LEAP-1B21	除降低推力额定值外, 与 LEAP-1B28 相同。 Same as LEAP-1B28 except for lower thrust rating.
LEAP-1B23	除降低推力额定值外, 与 LEAP-1B28 相同。 Same as LEAP-1B28 except for lower thrust rating.
LEAP-1B28B2C	除了推力控制由低于 1000 英尺时与 LEAP-1B27 相同, 和在 7000 英尺与 LEAP-1B28B2 相同外, 与 LEAP-1B28B2 相同。 Same as LEAP-1B28B2 except thrust is capped by LEAP-1B27 below 1,000 ft and fairs to equivalent of LEAP-1B28B2 thrust by 7,000 ft
LEAP-1B28BBJ1	与 LEAP-1B28 相同, 但按波音公务机定制。 Same as LEAP-1B28 but customized for Boeing Business Jet application
LEAP-1B28BBJ2	与 LEAP-1B28C 相同, 但按波音公务机定制。 Same as LEAP-1B28C, but customized for Boeing Business Jet application

每个发动机型别的零件列表包含一个构型号来标识发动机构型。发动机构型表示为 LEAP-1BxxG0y, 其中 xx 表示型号, y 代表服务通告 LEAP-1B 服务通告 72-0187 中描述的适用构型。

The parts list for each engine model contains a configuration group number to identify the engine configuration. The engine model configuration is identified as LEAP-1BxxG0y where xx is the model and y is the applicable configuration as described in LEAP-1B Service Bulletin 72-0187.

注释 6/NOTE 6.

不适用/NOT APPLICABLE

注释 7/NOTE 7.

兼容的系统组件/COMPATIBLE SYSTEM ASSEMBLIES

反推/Thrust Reverser

LEAP-1B 发动机被批准使用波音飞机反推系统 P/N 315A6295

The LEAP-1B engine is approved for use with the Boeing thrust reverser system P/N 315A6295

注释 8/NOTE 8.

不适用/NOT APPLICABLE

注释 9/NOTE 9.

不适用/NOT APPLICABLE

注释 10/NOTE 10.

不适用/NOT APPLICABLE

注释 11/NOTE 11.

SPECIAL REQUIREMENTS/特殊要求

双发延程飞行/ETOPS

注 5 中包括的发动机型号符合 §§ 33.4 (A33.3(c))、33.71(c)(4)和 33.201 条款的要求, 因此可以安装在延程 (ETOPS) 和早期 ETOPS 的飞机上。证实的改航时间是最大连续推力工作 180 分钟加保持推力工作 15 分钟。ETOPS 能力并不构成飞机或运行层面执行双发延程飞行的必要批准。

The engines models included in Note 5 have complied 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. Note that ETOPS eligibility does not constitute airplane or operational level approvals necessary to conduct ETOPS flights.

LEAP-1B S/B 71-0002 规定了执行双发延程飞行操作的要求。

LEAP-1B S/B 71-0002 defines the requirements for conducting ETOPS operation.

限时派遣准则/Time Limited Dispatch Criteria

LEAP-1B 发动机翻修手册 (LEAP-1B-05-17-00) 的适航限制章节规定了派遣的准则以及发动机控制系统的维护要求, 并定义了不同的构型和最大运行间隔。

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

作为派遣准则批准的应急措施, LEAP 建立了一个控制系统可靠性监测方案, 以确保整个发动机控制系统和特定部件的故障率不超过可靠性分析所允许的最大值。

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.

进气系统结冰/Induction System Icing

波音 B737MAX 型飞机为 LEAP-1B28、-1B28B2、-1B28B1、-1B28B3、-1B27 和-1B25 的安装说明, 证实了 14 CFR 第 33.68 条, 进气系统结冰。在不同的飞机型号或型别上安装这些发动机, 需要单独评估和符合 14 CFR 第 33.68 条的符合性结论。

Demonstration of compliance to 14 CFR Part 33.68, Induction System Icing, is installation specific to the Boeing B737 MAX model aircraft for the LEAP-1B28, -1B28B2, -1B28B1, -1B28B3, -1B27 and -1B25 engines models. Installation of these engine models on different airplane models or types will require a separate evaluation and finding of compliance to 14 CFR Part 33.68.

注释 12/NOTE 12.

不适用/NOT APPLICABLE

注释 13/NOTE 13.

特殊操作程序/SPECIAL OPERATING PROCEDURES

负过载运行/Negative G Operation

仅限于负过载运行时, 可以以低于最小滑油压力 (17.4 psid) 运行 10 秒钟。见 LEAP-1B 具体的操作指导手册, GEK 113769

During negative g operation only, it is permissible to operate below minimum oil pressure (17.4 psid) for a maximum of 10 seconds. See LEAP-1B Specific Operating Instruction Manual, GEK 113769

最小飞行慢车/Minimum Flight Idle

飞行中允许的最小慢车是一个不可调的限制, 预设 EEC 的控制率中。飞行慢车基于推力杆位置和操作条件, 具体在 LEAP-1B 特定工作指导手册 GEK 113769 中规定

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-1B Specific Operating Instructions Manual, GEK 113769

起飞时间限制/Takeoff Time Limit

在另一发停车的紧急情况下, 正常的 5 分钟起飞推力可以延长到 10 分钟, 具体在 LEAP-1B 特定的工作指导手册 GEK 113769 中规定

The normal 5 minute takeoff rating may be extended to 10 minutes for engine out contingency, as specified in the LEAP-1B Specific Operating Instructions Manual, GEK 113769

结冰运行/Icing Operation

在结冰条件下运行, 要求、限制和注释在 LEAP-1B 的操作指导手册 GEK 113769 中规定

For operation in icing conditions; requirements, limitations, and notes are specified in the LEAP-1B Specific Operating Instructions Manual, GEK 113769

注释 14/NOTE 14.**不适用/NOT APPLICABLE****注释 15/NOTE 15.****适用的安装、维护和大修手册****APPLICABLE INSTALLATION, MAINTENANCE AND OVERHAUL MANUALS**

适用的安装和运行手册有/The applicable installation and operating manuals are:

- 1) 涡轮发动机安装手册 (EIM): CRL-2106b_1
Turbofan Engine Installation Manual (EIM): CRL-2106b_1
- 2) 具体的操作指导 (SOI): CRL-2105b (GEK 113769)
Specific Operating Instructions (SOI): CRL-2105b (GEK 113769)

持续适航文件 (ICA): 发动机车间手册、服务通告、大修和维护手册、维修手册、供应商手册和设计更改, 其中包括 EASA 批准或由 DOA No.EASA.21J.086 授权可以被 FAA 接受或视为 FAA 批准的阐述。维修数据和相关说明被视为 FAA 批准或接受。这些批准仅针对型号设计。ICA 包括:

Instructions for Continued Airworthiness (ICA): 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 FAA and considered FAA approved. Repair data and related instructions are considered FAA approved or accepted as applicable. These approvals pertain to the type design only. The ICA includes:

- 1) 发动机车间手册/Engine Shop Manual (ESM): ESM.21
- 2) 标准实践手册/Standard Practices Manual (SPM): SPM.25
- 3) 消耗品手册/Consumable Product Manual (CPM): CPM.25
- 4) 无损检测手册/Non Destructive Test Manual (NDTM): NDTM.25
- 5) 部件维修手册(CMM): 由 CFM 发布
Components Maintenance Manuals (CMM): as published by CFM
- 6) 服务通告(SB): 由 CFM 发布/Service Bulletins (SB): as published by CFM
- 7) 维护手册: 见飞机维护手册(AMM)
Maintenance Manual: see Aircraft Maintenance Manual (AMM)
- 8) 故障隔离手册: 见飞机故障隔离手册(FIM)
Fault Isolation Manual: see Aircraft Fault Isolation Manual (FIM)

注释 16/NOTE 16.**进口要求/IMPORT REQUIREMENTS**

型号合格证持有人, CFM International, S.A., 是一家由法国赛峰集团和通用电气公司为 CFM56 和 LEAP 系列发动机的取证、销售和支持而建立并联合拥有的公司。LEAP-1B 系列发动机是为波音 737MAX 系列飞机设计的。关于用于生产的型号合格证利益, 通用电气和赛峰根据 CFM International, S.A.的协议共同行使。

The type certificate holder, CFM International, S.A., is a company established and jointly owned by Safran of France and the General Electric Company for the certification, sale, and support of CFM56 & LEAP series engines. The LEAP-1B engine series is a product line designed to power the Boeing 737MAX series of aircraft models. With respect to the benefits of type certification for production, General Electric and Safran function as licensees of CFM International, S.A.

无论发动机总装地点, 所有的 LEAP-1B 发动机将被分配带有“602”前缀的序列号。最终装配的地点可以从发动机制造商推断出来, 并在发动机铭牌上注明, 同时包含生产日期。通用电气在美国生产的发动机与由赛峰集团在法国生产的发动机相同, 并可以完全互换。

All LEAP-1B engines will be assigned serial numbers sequentially, with the three-digit prefix “602-” 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 Safran.

如果在欧洲航空安全局 (EASA) 的生产许可证 No.FR.21G.0007 的授权下, 已经签发了适航批准证书 (EASA Form 1 – 批准放行证书或 JAA Form 1) 并附加在产品或发货项目上, 在法国生产的单元体、组件或零件可用于本型号发动机。Modules, assemblies, or parts produced in France are eligible for use in engines produced to this type certificate provided an airworthiness approval certificate (EASA Form 1 – Authorized Release Certificate or JAA Form 1) issued by Safran 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 (Ref. 14 CFR §21.502).

注释 17/ NOTE 17. 发动机关键部件/CRITICAL ENGINE PARTS

发动机关键部件的寿命限制发布于 LEAP-1B 发动机车间手册 05 章 ALS 部分。
Life limits established for critical engine parts are published in the ALS section of Chapter 05 of the LEAP-1B Engine Shop Manual, ESM.21.

注释 18/ NOTE 18. 不适用/NOT APPLICABLE**注释 19/NOTE 19. 最大允许的发动机转子转速
MAXIMUM PERMISSIBLE ENGINE ROTOR SPEEDS**低压转子/Low pressure rotor (N1):

4586 rpm (104.3 % - 100 % N1, N1 确定为 4397 rpm)

高压转子/High pressure rotor (N2):

服务通告 LEAP-1B 72-0169 之前/Pre-SB LEAP-1B 72-0169:

20171 rpm (117.5 % - 100 % N2, N2 确定为 17167 rpm)

服务通告 LEAP-1B 72-0169 之后/Post-SB LEAP-1B 72-0169:

19828 rpm (指示值/indicated 117.5%)

注释 20/ NOTE 20. 不适用/NOT APPLICABLE**注释 21/ NOTE 21. 最大允许的引气/MAXIMUM PERMISSIBLE BLEED AIR EXTRACTION**

位置 LOCATION	温度修正后的风扇转速 TEMPERATURE CORRECTED FAN SPEED	流量限制 FLOW LIMIT
高压压气机第 4 级 HPC Stage 4	高于最小慢车速度的所有速度。 All speeds above minimum idle.	10% 主流道流量* 10% of primary airflow*
高压压气机第 10 级 HPC Stage10	高于最小慢车速度的所有速度。 All speeds above minimum idle.	15% 主流道流量* 15% of primary airflow*
外涵道 Bypass Duct	高于最小慢车速度的所有速度。 All speeds above minimum idle.	1% 主流道流量 1% of primary airflow

* -绝对最大值。见 LEAP-1B 安装手册详细引气规律。

* -Absolute maximum. Refer to the LEAP-1B Installation Manual, for detailed bleed schedules.

注释 22/ NOTE 22. 不适用/NOT APPLICABLE**注释 23/ NOTE 23. 排放和燃油泄漏/EXHAUST EMISSIONS AND FUEL VENTING**

LEAP-1B 系列发动机型号符合如下在 2024 年 4 月 24 日生效的 14 CFR 第 34 部 7A 修正案和 2022 年 12 月 23 日生效的 40 CFR 第 1031 部的排放标准。

The following emissions standards promulgated in 14 CFR part 34, amendment 7A, effective May 24, 2024, and 40 CFR part 1031, effective December 23, 2022, have been complied with for the LEAP-1B series engines models

燃油排泄排放标准: 14 CFR 第 34.11 条款, 以及 40 CFR 第 1031.30(b)条款。

Fuel Venting Emission Standards: 14 CFR 34.11; in addition, 40 CFR 1031.30(b)

发烟指数 (SN) 排放标准: 14 CFR 第 34.21(e)条款, 以及 40 CFR 第 1031.60(a)(5)款。

Smoke Number (SN) Emission Standards: 14 CFR 34.21(e); in addition, 40 CFR 1031.60(a)(5)

一氧化碳 (CO) 排放标准: 14 CFR 第 34.21(d)(1)(ii)条款, 以及 40 CFR 第 1031.60(d)条款。

Carbon Monoxide (CO) Emission Standards: 14 CFR 34.21(d)(1)(ii); in addition, 40 CFR 1031.60(d)

碳氢化合物 (HC) 排放标准: 14 CFR 第 34.21(d)(1)(i)条款, 以及 40 CFR 第 1031.60(c)条款。

Hydrocarbons (HC) Emission Standards: 14 CFR 34.21(d)(1)(i); in addition, 40 CFR 1031.60(c)

氮氧化合物 (NOX) 排放标准: 14 CFR 第 34.23(b)(1)条款, 以及 40 CFR 第 1031.60(e)(5)

条款（等同于发动机满足 Tier8 的排放标准）。

Oxides of Nitrogen (NOx) Emission Standards: 14 CFR 34.23(b)(1); in addition, 40 CFR 1031.60(e)(5) (also known as Tier 8 new type)

非挥发性颗粒物（nvPM）质量浓度排放标准：14 CFR 第 34.25(a)(1)条款，以及 40 CFR 第 1031.60(a)(6)条款（等同于发动机满足 Tier10 的排放标准）

non-volatile Particulate Matter (nvPM) Mass Concentration Emission Standards: 14 CFR 34.25(a)(1); in addition, 40 CFR 1031.60(a)(6) (also known as Tier 10)

非挥发性颗粒物（nvPM）质量和数量排放标准：14 CFR 第 34.25(a)(2)条款，以及 40 CFR 第 1031.60(b)(2)条款（等同于生产中的发动机满足 Tier11 的排放标准）

nvPM Mass and Number Emission Standards: 14 CFR 34.25(a)(2); in addition, 40 CFR 1031.60(b)(2) (also known as Tier 11 in-production)

除了型号合格证数据单 No. E00088EN 确定的审定要求的符合性之外，发动机制造商声明已证明符合国际民航组织(ICAO)2020 年 7 月 20 日生效的附件 16 第二卷第四版，第 10 修正案的相关要求：

- 第 II 部分，第二章，关于燃油排泄
- 第 III 部分，第二章，2.2.2 部分，关于发烟指数
- 第 III 部分，第二章，2.3.2 部分，关于一氧化碳（CO）和碳氢化合物（HC）
- 第 III 部分，第二章，2.3.2. e 部分，关于氮氧化合物（NOX）（CAEP/8）
- 第 III 部分，第四章，4.2.2.1 部分，关于 nvPM 质量浓度 (CAEP/10) 以及
- 第 III 部分，第四章，4.2.2.2 部分，关于 nvPM 质量和数量 (CAEP/11)

In addition to the finding of compliance based on the certification requirements defined in TCDS No. E00088EN, the engine manufacturer has declared that the ICAO emissions standards identified in Annex 16, Volume II, Fourth Edition, Amendment 10, effective July 20, 2020, have also been demonstrated for the following:

- Part II, Chapter 2 for Fuel Venting,
- Part III, Chapter 2, Section 2.2.2 for Smoke number,
- Part III, Chapter 2, Section 2.3.2 for Carbon monoxide and Hydrocarbons,
- Part III, Chapter 2, Section 2.3.2.e for Oxides of Nitrogen (also known as CAEP/8),
- Part III, Chapter 4, Section 4.2.2.1 for nvPM Mass Concentration (also known as CAEP/10),and
- Part III, Chapter 4, Section 4.2.2.2 for nvPM Mass and Number (also known as CAEP/11)

注释 23a/ NOTE 23a.

以下发动机型号（LEAP-1B28, LEAP-1B28B2, LEAP-1B28B1, LEAP-1B28B3, LEAP-1B27, LEAP-1B25, LEAP-1B21, LEAP-1B23, LEAP-1B28B2C, LEAP-1B28BBJ1, LEAP-1B28BBJ2）满足中国民航规章《涡轮发动机飞机燃油排泄和排气排出物规定》（CCAR-34R1）（2023 年 1 月 1 日生效）的下列标准：

- 非挥发性颗粒物排放标准：CCAR 34.21(e)款（CAEP/10 与 CAEP/11）

The following emissions standards promulgated in CAAC regulation CCAR-34R1, effective January 1st, 2023, have been complied with for LEAP-1B28, LEAP-1B28B2, LEAP-1B28B1, LEAP-1B28B3, LEAP-1B27, LEAP-1B25, LEAP-1B21, LEAP-1B23, LEAP-1B28B2C, LEAP-1B28BBJ1, LEAP-1B28BBJ2:

- Non-volatile Particulate Matter emission standards: CCAR 34.21(e) (CAEP/10 and CAEP/11)

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