

型号认可证数据单

TYPE VALIDATION CERTIFICATE DATA SHEET

编号/No: VTC0190E

版次/Revision: 3

型号/Type:

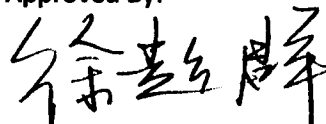
Arriel 2B, 2B1, 2B1A

Arriel 2D

Arriel 2C, 2C1, 2C2

Arriel 2S1, 2S2

批准人/Approved By:



日期/Date: 2012 年 4 月 26 日

本数据单是型号认可证（编号：VTC0190E）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: VTC0190E), 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:

TURBOMECA

64511 Bordes Cedex, France

DOA-ref: EASA.21J.070

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	15
版次/Revision	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
页数/ Pages	16	17	18	19	20	21									
版次/Revision	3	3	3	3	3	3									

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	VTC0190E; 版次: 3; 颁发日期: 2012年4月26日 No.VTC0190E; Revision 3; Issue Date: 26 April 2012	E.001; 版次 06 颁发日期 2011 年 5 月 16 日 No. E.001; Issue No.06; Issue Date: 16 May 2011
历史 History	VTC0190E; 版次: 2; 颁发日期: 2008 年 7 月 11 日 No.VTC0190E; Revision 2; Issue Date: 11 July 2008	E.001; 版次 04 颁发日期 2007 年 2 月 12 日 No. E.001; Issue No.04; Issue Date: 12 February 2007

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: TURBOMECA
64511 Bordes Cedex, France DOA-ref: EASA.21J.070

5. 制造厂/Manufacturer: TURBOMECA

6. ETOPS: 不适用/NA

7. CAAC专用要求/CAAC Special Requirements: 满足中国3号燃油（GB6537-2006）牌号的要求。
/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 审定基础/Certification Basis

1、适航标准和环保要求/Airworthiness Standards and Environmental Protection Requirements:

型号/Model	适航标准/Airworthiness Standards	环保要求/Environmental Protection Requirements
Arriel 2B	JAR-E第9版, 1994年10月21日	ICAO 附件 16 第 II 卷, 第 2 部分, 第 2 章 (1993 版) 燃油排放规定。 /Fuel venting provisions of ICAO Annex 16, Vol II, Part 2, Chapter 2 (Edition 1993)
Arriel 2B1	/JAR-E Change 9 dated 21 October 1994	
Arriel 2B1A	橙色页 E/96/1, 1996 年 8 月 8 日 /Orange Paper E/96/1 dated 08 August 1996	
Arriel 2D	JAR-E第9版, 1994年10月21日 /JAR-E Change 9 dated 21 October 1994 橙色页 E/96/1, 1996 年 8 月 8 日 /Orange Paper E/96/1 dated 08 August 1996 橙色页 E/97/1, 1997 年 12 月 30 日 /Orange Paper E/97/1 dated 30 December 1997 JAR-E第10版中JAR-E 740和E 745, 1999年8月5日 /JAR-E 740 and E 745 of JAR-E Change 10 dated 15 August 1999 CS-E第1修正案中CS-E 50 (d)和(f)和CS-E 1030, 2007年12月10日 /CS-E 50 (d) and (f), and CS-E 1030 of CS-E Amendment 1 dated 10 December 2007 CS-E第2修正案中CS-E 570, 2009年12月18日 /CS-E 570 of CS-E Amendment 2 dated 18 December 2009	ICAO 附件 16 第 II 卷, 第 II 部分, 第 2 章, 第 6 修正案, 适用于涡轴发动机的环保要求, 2008 年 11 月 20 日生效。 /Environmental protection requirements of ICAO Annex 16 Volume II, Part II, Chapter 2 Amendment 6 effective 20 November 2008, as applicable to turboshaft engines.
Arriel 2C	JAR-E第9版, 1994年10月21日	ICAO 附件 16 第 II 卷, 第 2 部分, 第 2 章 (1993 版) 燃油排放规定。 /Fuel venting provisions of ICAO Annex 16, vol II, Part 2, Chapter 2 (Edition 1993)
Arriel 2C1	/JAR-E Change 9 dated 21 October 1994	
Arriel 2S1	橙色页 E/96/1, 1996 年 8 月 8 日 /Orange Paper E/96/1 dated 08 August 1996	
Arriel 2C2	JAR-E第9版, 1994年10月21日	(EC) 规章1702/2003, 21A.18(b)中的环保要求 /Environmental protection requirements of 21A.18(b) of Regulation (EC) 1702/2003
Arriel 2S2	/JAR-E Change 9 dated 21 October 1994 橙色页 E/96/1, 1996 年 8 月 8 日 /Orange Paper E/96/1 dated 08 August 1996 橙色页 E/97/1, 1997 年 12 月 30 日 /Orange Paper E/97/1 dated 30 December 1997	

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2、专用条件，偏离和等效安全方法/Special Conditions, Deviations and Equivalent Safety Findings:

型号/Model	专用条件/Special Conditions	偏离/Deviations	等效安全方法/Equivalent Safety Findings
Arriel 2B	无/none	JAR-E 570(a)(4)(ii)和(5)(ii)一机组指示 /JAR-E 570 (a)(4)(ii) and (5)(ii) - Indication to the flight crew	JAR-E 740 耐久试验 /JAR-E 740 Endurance test
Arriel 2B1			
Arriel 2B1A			
Arriel 2D	SC1: 涡轴发动机30分钟起飞额定功率的批准 /SC1 : Approval of Turboshift 30-minute Take-off Power Rating	无/none	无/none
Arriel 2C	SC1 至 SC12: 30 秒, 2 分钟和连续单发不工作额定功率批准的专用条件 /SC1 to SC12 : Special Conditions for approval of the 30-Second, 2-minute and Continuous OEI ratings	JAR-E 570(a)(4)(ii)和(5)(ii)一机组指示 /JAR-E 570 (a)(4)(ii) and (5)(ii) - Indication to the flight crew	无/none
Arriel 2C1			JAR-E 80, E740 “双通道控制系统的耐久性” /JAR-E 80, E740 “Dual channel control system endurance”
Arriel 2S1			无/none
Arriel 2C2	SC1 至 SC12: 30 秒, 2 分钟和连续单发不工作额定功率批准的专用条件 /SC1-C2: Special Conditions for certification of “30 second and 2 minutes OEI ratings” SC13 至 SC15: HIP/SARM 额定功率批准的专用条件 /SC2-C2: Special Condition for certification of HIP/SARM rating		无/none
Arriel 2S2			

II 技术特性/Technical Characteristics

1、型号设计定义/Type Design Definition:

型号/Model	型号设计定义/Type Design Definition 件号/P/N
Arriel 2B	0 292 00 534 0
Arriel 2B1	0 292 00 541 0
Arriel 2B1A	0 292 00 547 0
Arriel 2D	0 292 00 002 0
Arriel 2C	0 292 00 536 0
Arriel 2C1	0 292 00 539 0
Arriel 2C2	0 292 00 542 0
Arriel 2S1	0 292 00 531 0
Arriel 2S2	0 292 00 545 0

2、描述/Description:

Arriel 2 系列型发动机是涡轮轴发动机，包括轴流式进气道，由单级涡轮驱动的一级轴流式压气机和一级离心式压气机，形燃烧室，和驱动位于尾部减速齿轮组件的单级动力涡轮。位于前端的附件齿轮箱由燃气发生器驱动。发动机安装节是发动机型号定义的一部分。启动发电机不是发动机型号定义的一部分。Arriel 2 系列型发动机由电子发动机控制系统进行控制，根据型号（参见 II.7）是标准或带有机械备份模式的单通道或双通道的控制系统。

/The Arriel 2 engine is a turboshaft engine consisting of an axial air intake, an axial compressor and a centrifugal compressor driven by a single stage turbine, a combustion chamber, and a single stage power turbine driving a reduction gearbox located at the rear. An accessory drive gearbox, driven by the gas generator, is located at the front. Mounts are part of the engine type definition. Starter-generator is not part of the engine type definition. The Arriel 2 engine is controlled by an electronic engine control system, featuring a single or dual channel with standard or optional mechanical back-up depending on the model (see section III.7).

3、设备/Equipment: 包含在型号设计定义中/Included in Type Design Definition

4、尺寸/Dimension:

型号/Model	长度（米）/Length (m)	高度（米）/Height (m)	宽度（米）/Width (m)
Arriel 2B	1.181	0.616	0.498
Arriel 2B1	1.140	0.616	0.491
Arriel 2B1A			
Arriel 2D	1.177	0.616	0.500
Arriel 2C	1.181	0.616	0.498
Arriel 2C1	1.015	0.576	0.498
Arriel 2C2			
Arriel 2S1	1.539	0.715	0.504
Arriel 2S2			0.497

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5、干重/Dry Weight:

型号/Model	干重 (千克) /Dry Weight (Kg)	注/Note
Arriel 2B	134.0	(1)
Arriel 2B1	132.2	
Arriel 2B1A	129.2	(2)
Arriel 2D	132.9	
Arriel 2C	131.0	
Arriel 2C1	129.2	
Arriel 2C2	131.5	
Arriel 2S1	131.2	
Arriel 2S2	131.0	

注 (1) : 对于 Arriel 2B, 2B1, 自由飞轮是直升机部件, 该重量包含自由轮重量。

/Note (1) for Arriel 2B, 2B1: Free wheel is under helicopter responsibility, and weight includes free wheel assembly.

注 (2) : 对于 Arriel 2B1A, 2D, 自由飞轮是直升机部件, 该重量不包含自由轮重量。

/Note (2) for 2B1A, 2D: Free wheel is under helicopter responsibility, but weight does not include free wheel assembly.

6、额定值/Rating:

额定值—功率 (千瓦) /Ratings - Power (kW)	最大持续时间 /Maximum duration	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
30 分钟起飞 (1) /30-minute Take-off (1)	30 分钟 /30 minutes	n/a	n/a	n/a	598
起飞 /Take-off	5 分钟 /5 minutes	557	557	501	598
最大连续 /Maximum Continuous	无限制 /Unlimited	543	543	501	598

额定值—功率 (千瓦) /Ratings - Power (kW)	最大持续时间 /Maximum duration	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
30 秒钟 OEI /OEI-30 sec	30 秒钟 /30 seconds	704	718	750	735	771
2 分钟 OEI /OEI-2 min	2 分钟 /2 minutes	635	646	713	663	699
连续 OEI /OEI Continuous	无限制 /Unlimited	610	616	640	639	659
30 分钟起飞/ 30-minute Take-off (1)	30 分钟/ 30 minutes	n/a	n/a	612	601	601
起飞/Take off	5 分钟 /5 minutes	531	531	612	601	601
最大连续 /Maximum Continuous	无限制 /Unlimited	531	531	612	592	601

注 (1) : 早期型号中也叫做 HIP/SARM。

/Note (1): Also called HIP/SARM in earlier models.

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附注/Additional Notes:

下列条件定义了上述相应的性能参数最小值/The performance values specified above correspond to minimum values defined under the following conditions.

- 在压气机进气平面中平均涡流角小于或等于 0.5° ;
/mean swirl angle in the compressor air intake plane less than or equal to 0.5°
- 试车台在海平面国际标准大气温度条件下;
/ISA conditions at sea level, on test bed,
- 发动机装有试车台进气和主排气管;
/engine equipped with a test bed air intake and primary exhaust pipe,
- 没有引气;
/no air bleed,
- 除了发动机运转必须的没有任何附件的功率提取;
/no power drawn by any accessories other than those required for engine operation,
- 对于 2B, 2B1, 2B1A, 2D, 2C, 2C1, 2C2 型输出轴转速为 6000rpm; 对于 2S1, 2S2 型输出轴转速为 6409 rpm;
/output shaft rotation speed: 6000 rpm for 2B, 2B1, 2B1A, 2B1B, 2D, 2C, 2C1, 2C2; 6409 rpm for 2S1, 2S2,
- 燃油的最低热值: 43136 kJ/kg。
/fuel Low Heat Value: 43136 kJ/kg.

由最先达到的限制值限定声明的功率: 热力参数或是机械参数限制值。对于起飞、30 分钟起飞和最大连续状态, 机械限制与在生效的机械限制和 EECU 扭矩限制两者之间最先达到的扭矩限制相关。

/Declared Powers are limited by the first reached limit: either by thermal or mechanical limits. For Take-off, 30- minute Take-off and Maximum Continuous the mechanical limits corresponds to the first torque limits reached between validated mechanical limit and EECU torque limit.

7、控制系统/Control System:

型号/Model	控制系统/Control System
Arriel 2B	带有手工备份的单通道电子发动机控制系统 /Single channel electronic engine control system with manual backup control
Arriel 2B1	带有可选的辅助备份的双通道电子发动机控制系统 /Dual channel electronic engine control system with optional auxiliary back-up control
Arriel 2B1A	
Arriel 2D	带有辅助备份的双通道电子发动机控制系统 /Dual channel electronic engine control system with auxiliary back-up control
Arriel 2C	带有手工备份的单通道电子发动机控制系统 /Single channel electronic engine control system with manual backup
Arriel 2C1	带有可选的辅助备份的双通道电子发动机控制系统 /Dual channel electronic engine control system with optional auxiliary back-up control
Arriel 2C2	
Arriel 2S1	带有手工备份的单通道电子发动机控制系统 /Single channel electronic engine control system with manual backup control
Arriel 2S2	带有辅助备份的双通道电子发动机控制系统 /Dual channel electronic engine control system with auxiliary back-up control

8、油料 (燃油/滑油/添加剂) /Fluids (Fuel/Oil/Additives): 参见安装手册/see Installation Manual

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9、航空器附件驱动/Aircraft Accessory Drives:

启动机发电机输出/Starter-generator Output							
型号/Model	旋转方向 /Rotation direction	转速 /Rotation Speed (rpm)	过载时最大扭矩 /Maximum Torque in Overload (daNm)	最大静悬吊 /Maximum static overhang (daNm)	保险轴分离扭矩 /Fuse shaft breakaway torque (daNm)	最大持续轴功率 /Maximum Permanent Shaft Power (kW)	
						双发 /Twin engine	OEI状态 /OEI situation
Arriel 2B	CW	11330	5.0	2.5	9.5	7.5	无/n/a
Arriel 2B1							
Arriel 2B1A			5.15				
Arriel 2D							
Arriel 2C	CW	11330	5.0	2.5	9.5	3.5	5.0
Arriel 2C1						5.0	
Arriel 2C2						7.5	
Arriel 2S1						7.5	7.5
Arriel 2S2						注（1） /Note（1）	

注(1): 对于 Arriel 2S2: 特定飞行条件下相关 OEI 计数的专用说明参见安装手册和维护手册中适航限制部分。

/Note (1): for Arriel 2S2: refer to Installation Manual and Airworthiness Limitation Section of the Maintenance Manual for specific instructions relative to OEI counting in certain flight conditions.

风扇冷却器驱动输出/Fan Cooler Drive Output							
型号/Model	旋转方向 /Rotation direction	转速 /Rotation Speed (rpm)	过载时最大扭矩 /Maximum Torque in Overload (daNm)	最大静悬吊 /Maximum static overhang (daNm)	保险轴分离扭矩 /Fuse shaft breakaway torque (daNm)	最大持续轴功率 /Maximum Permanent Shaft Power (kW)	
						双发 /Twin engine	OEI状态 /OEI situation
Arriel 2C2	CCW	11452	1.0	1.5	10.0	1.5	1.5
Arriel 2S1							
Arriel 2S2							

附注/Additional Notes:

—CW: 顺时针/clockwise;

—CCW: 逆时针/counter clockwise;

—从动力传动装置的外侧看指附件传动装置的旋转方向。

/The rotation direction of the power drives for the accessories is indicated considering the power drive seen from the outside.

—从发动机的后部看指发动机转子的旋转方向;

/The rotation direction of the engine rotors is indicated with respect to viewing the engine from its rear end.

更多详细情况参见安装手册。

/For further details see Installation Manual.

10、引气/Bleed Extraction

对于航空器使用的 P3 引气，在标准海平面条件下的最大气流为：

/P3 air bleed for aircraft use, Maximum flow rate at standard sea level conditions:

除了 Arriel 2D 的所有型号/All Models except:

起飞额定值为 100 g/s 和最大持续额定值为 98 g/s。

/100 g/s at Take-off rating and 98 g/s at Maximum Continuous rating

Arriel 2D:

最大连续、起飞和 30 分钟起飞额定值为 150 g/s。

/150 g/s at Maximum Continuous, Take-Off and 30-minute Take-off ratings.

更多详细情况参见安装手册。

/For further details, see Installation Manual.

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III 使用限制/Operational Limitations

1、温度限制/Temperature limits:

1.1、燃起发生器排气温度 (T45) 限制/Gas generator exhaust temperature (T45) limits

起动/on start-up:

T45启动 (°C) /T45 start-up (°C)	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
无限制时间 /For an unlimited duration	750			
最大超温 (<10 秒) /Maximum over temperature (<10 s)	865			840

T45 启动 (°C) /T45 start-up (°C)	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
无限制时间 /For an unlimited duration	750				
最大超温 (<10 秒) /Maximum over temperature (<10 s)	865		840	865	840

飞行中/in flight:

飞行中 T45 (°C) /T45 in flight (°C)	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
30 分钟起飞 (1) /30-minute Take-off (1)	n/a			962
起飞 /Take-off	915		924	962
最大连续 /Maximum continuous	849			918
最大瞬态 (<20秒) /Maximum transient (< 20 sec)	941			994

注 (1) : 早期型号中也叫做 HIP/SARM。

/Note (1): Also called HIP/SARM in earlier models.

飞行中 T45 (°C) /T45 in flight (°C)	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
30秒钟OEI /OEI 30 sec	1000		996	1000	996
2分钟OEI /OEI 2 min	941		944	941	944
连续OE I/OEI Continuous	912		926	912	926
30分钟起飞 (1) /30-minute Take-off (1)	n/a		929	912	930
起飞 /Take off	912		929	912	930
最大连续 /Maximum continuous	877		891	877	893

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注 (1) : 早期型号中也叫做 HIP/SARM。

/Note (1): Also called HIP/SARM in earlier models.

1.2、燃油温度/Fuel temperature:

最大温度/Maximum temperature: 参见安装手册/see Installation Manual

使用普通和替换燃油的定义参见安装手册/For definition of normal and restricted use fuels, see Installation Manual.

发动机起动时的最低温度/Minimum temperature for engine starting: 参见安装手册/see Installation Manual

—使用防冰添加剂的燃油温度/Use of anti-icing additive for fuel temperature

Arriel 2B, 2B1, 2B1A, 2B1B, 2C, 2D, 2C1, 2 S1: < -20°C

Arriel 2C2, 2S2: < -30°C

1.3、滑油温度/Oil temperature

发动机起动时最低滑油温度/Minimum oil temperature for engine starting:

对于使用动力学粘度为 5×10^{-6} m ² /s 的滑油 /for oil with a 5×10^{-6} m ² /s cinematic viscosity	发动机起动 /For engine starting		-30°C
	加速 /For power-up 0° C		0°C
对于使用动力学粘度为 3 到 3.9×10^{-6} m ² /s 的滑油 /for oil with a 3 to 3.9×10^{-6} m ² /s cinematic viscosity	发动机起动 /For engine starting	2B, 2B1, 2B1A	-45°C
		其他所有型号 /for all other models	-50°C
	加速 /For power-up		-10°C

最大滑油温度/Maximum oil temperature:

除Arriel 2D外的其他型号/for all Models except Arriel 2D: 115°C

Arriel 2D (与其他型号的测量位置不同) /for Arriel 2D (measured at a different location from other Models): 117°C

2、最大/最小转速/Maximum / Minimum Speeds:

2.1、燃气发生器转速 (N1) /Gas generator speed (N1)

100% N1=52110 rpm

N1 最小稳定转速/Minimum stabilised N1 speed:

N1 最小稳定转速 /Minimum Stabilised N1 Speed	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
慢车模式转速范围 /IDLE mode speed range	67 % — 68 % (34 914 — 35 435 rpm)			
飞行模式 (手动控制模式) /FLIGHT mode (manual control mode)	62% (32 308 rpm)			

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N1 最小稳定转速 /Minimum Stabilised N1 Speed	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
慢车模式转速范围 /IDLE mode speed range	67 % — 68 % (34 914 — 35 435 rpm)			48 % — 52 % (25 013 — 27 097 rpm)	
飞行模式（手动控制模式） /FLIGHT mode (manual control mode)	62 % (32 308 rpm)			62 % (32 308 rpm)	

N1 最大稳定转速/Maximum stabilised N1 speed:

N1 最大稳定转速 /Maximum Stabilised N1 Speed	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
30分钟起飞 (1) /30-minute Take-off (1)	n/a			101.87% (53 086 rpm)
起飞 /Take-off	101.24 % (52 756 rpm)			101.87% (53 086 rpm)
最大连续 /Maximum continuous	97.24 % (50 672 rpm)			99.88% (52 050 rpm)

注 (1) : 早期型号中也叫做 HIP/SARM。

/Note (1): Also called HIP/SARM in earlier models

N1 最大稳定转速 /Maximum Stabilised N1 Speed	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
30秒钟OEI /OEI 30 sec	105.6 % (55 051 rpm)	105.52 % (54 986 rpm)	106.05 % (55 265 rpm)	105.8 % (55 156 rpm)	105.89 % (55 178 rpm)
2分钟OEI /OEI 2 min	102.1 % (53 192 rpm)	101.95 % (53 126 rpm)	102.24 % (53 275 rpm)	102.4 % (53 386 rpm)	102.38 % (53 348 rpm)
连续OEI /OEI continuous	100.9 % (52 571 rpm)	100.76 % (52 506 rpm)	101.26 % (52 764 rpm)	101.2 % (52 756 rpm)	101.28 % (52 776 rpm)
30分钟起飞 (1) /30-minute Take-off (1)	n/a	n/a	101.86 % (53 079 rpm)	101.2 % (52 756 rpm)	101.88 % (53 089 rpm)
起飞 /Take off	101.1 % (52 660 rpm)	101.27 % (52 776 rpm)	101.86 % (53 079 rpm)	101.2 % (52 756 rpm)	101.88 % (53 089 rpm)
最大连续 /Maximum Continuous	98.9 % (51 520 rpm)	99.09 % (51 637 rpm)	99.64 % (51 922 rpm)	99.1 % (51 616 rpm)	99.71 % (51 959 rpm)

注 (1) : 早期型号中也叫做 HIP/SARM

/Note (1): Also called HIP/SARM in earlier models

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瞬态转速/Transient speeds:

瞬态转速/Transient Speeds	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
最大超转 (< 20秒) /Maximum overspeed (< 20 sec)	102.3 % (53 312 rpm)			102.97% (53 658 rpm)

瞬态转速/Transient Speeds	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
从慢车到飞行模式的瞬态 /Transfer from IDLE to FLIGHT mode	n/a			2 % — 62 % (27 097 — 32 308 rpm) Note (1)	
最大超转 (< 20秒) /Maximum overspeed(< 20 sec)	102.3 % (53 312 rpm)			102.3 % (53 312 rpm) Note (2)	102.98 % (53 661 rpm) Note (2)

注 (1) : 避免连续在此范围内工作

/Note (1): avoid continuous operation in this range

注 (2) : 所有发动机工作

/Note (2): all engines operating

2.2、自由涡轮转速 (N2) /Power turbine speed (N2)

除了 Arriel 2D 外所有发动机/for all Models except Arriel 2D: 100 % N2 = 39095 rpm

Arriel 2D/for Arriel 2D: 100 % N2 = 39158 rpm

最小 N2 转速—飞行模式/Minimum N2 speed – Flight mode:

最小N2转速—飞行模式 /Minimum N2 Speed – Flight Mode	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
稳态功率打开 /Stabilised Power on	90.5 % (35 381 rpm)			90.5 % (35 437 rpm)
稳态功率关闭 /Stabilised Power off	85.0 % (33 230 rpm)			85 % (33 284 rpm)
瞬态 (< 20秒) /Transient (< 20 sec)	68.0 % (26 584 rpm)			68 % (26 627 rpm)
注 /Notes	(1)	(1)	(1) & (2)	n/a

注 (1) : 在地面运行中避免在 87.0%到90.5% (34012 到35381 rpm) 范围内连续工作。

/Note (1): During ground run avoid continuous operation in the range 87.0 % to 90.5 % (34 012 to 35 381 rpm).

注 (2) : 对于 2B1A 最小自动辅助备份模式退出门限值为 96.71 % (37 809 rpm)。

/Note (2): Minimum automatic auxiliary backup mode exit threshold is 96.71 % (37 809 rpm) for 2B1A.

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最小N2转速—飞行模式 /Minimum N2 Speed - Flight Mode	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
稳态功率打开 /Stabilised Power on	90.5 % (35 381 rpm)			90.5 % (35 381 rpm)	
稳态功率关闭 /Stabilised Power off	85.0 % (33 230 rpm)				
瞬态 (< 20秒) /Transient (< 20 sec)	68.0 % (26 584 rpm)				
注 /Notes	(1)				

注 (1) : 在地面运行中避免在 87.0%到90.5% (34012 到 35381 rpm) 范围内连续工作。

/Note (1): During ground run avoid continuous operation in the range 87.0 % to 90.5 % (34 012 to 35 381 rpm).

最大 N2 转速—飞行模式/Maximum N2 speed – Flight mode

最大N2转速—飞行模式 / Maximum N2 speed - Flight Mode	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
稳态 /Stabilised	108.5 % (42 418 rpm)			108.48 % (42 477 rpm)
瞬态 (< 20秒) 功率打开 /Transient (< 20 sec) Power on	109.0 % (42 613 rpm)			108.8 % (42 613 rpm)
瞬态 (< 20秒) 功率关闭 /Transient (< 20 sec) Power off	121.0 % (47 305 rpm)			119.0 % (46 598 rpm)
注 /Notes	n/a	(1)		

注 (1) : 对于 2B1 最大自动辅助备份模式退出门限值为 115.0% (44 960 rpm), 对于 2B1A 为 103.19 % (40 342 rpm), 对于 2D 为 115.0 % (45 032 rpm)。

/Note (1): Maximum automatic auxiliary backup mode exit threshold: 115.0 % (44 960 rpm) for 2B1, 103.19 % (40 342 rpm) for 2B1A, 115.0 % (45 032 rpm) for 2D.

最大N2转速—飞行模式 / Maximum N2 speed - Flight Mode	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
稳态 /Stabilised	108.5 % (42 418 rpm)				
瞬态 (< 20秒) 功率打开 /Transient (< 20 sec) Power on	109.0 % (42 613 rpm)				112.0 % (43 719 rpm)
瞬态 (< 20秒) 功率关闭 /Transient (< 20 sec) Power off	121.0 % (47 305 rpm)				

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3、推力/扭矩限制/Thrust / Torque Limits:

N2 最小稳态转速工作状态时中轴上的最大扭矩/Maximum torque on shaft during operation at N2 minimum stabilized speed:

最大扭矩 (daNm) /Maximum Torque (daNm)	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
30分钟起飞 (1) /30-minute Take-off (1)	n/a			96.0
起飞 /Take-off	91.3			96.0
最大连续 /Maximum continuous	91.3			96.0
最大超扭 (<20秒) /Maximum over-torque (<20sec)	132.2			134.2
注 /Notes	n/a	(2)		

注 (1): 早期型号中也叫做 HIP/SARM。

/Note (1): Also called HIP/SARM in earlier models.

注 (2): 对于 2B1 自动辅助备份模式退出门限值为 91.3 daNm, 对 2B1A 为 71.4 daNm, 对 2D 为 101.8 daNm。

/Note (2): Automatic auxiliary backup mode exit threshold: 91.3 daNm for 2B1, 71.4 daNm for 2B1A, 101.8 daNm for 2D.

最大扭矩 (daNm) /Maximum Torque (daNm)	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
30秒钟OEI /OEI 30 sec	116.8	118.7	119.3	120.3	
2分钟OEI /OEI 2 min	107.3	107.9	116.0	113.2	
连续OEI / Continuous	103.0	101.55	101.8	102.5	
30分钟起飞 (1) /30-minute Take-off (1)	n/a		97.3	92.5	
起飞 /Take-off	92.5		97.3	92.5	
最大连续 /Maximum continuous	92.5		97.3	92.5	
最大超扭 (<20秒) /Maximum over-torque (<20sec)	132.2			143.0	
注 /Note	(2)			n/a	

注 (1): 早期型号中也叫做 HIP/SARM。

/Note (1): Also called HIP/SARM in earlier models.

注 (2): 经验证在 121.9 daNm 的扭矩限制下无限连续 OEI 后无需特殊的维护手段。

/Note (2): Torque limit of 121.9 daNm has been validated for unlimited continuous OEI usage with no specific maintenance actions.

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附注：上述声明的扭矩相当于最小稳定 N2 时在生效的发动机扭矩限制和 EECU 原理扭矩限制之间最先达到的扭矩限制。

/Additional Note: Torque showed above correspond to the first reached torque limit between the validated engine torque limit and EECU torque law limit at minimum N2 stabilized.

4、压力限制/Pressure Limits:

4.1 滑油压力/Oil pressure

压力限制/Pressure limits:

压力限制(kPa) /Pressure Limits (kPa)	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
最小滑油压力 /Minimum Oil Pressure	110			(1)
最大滑油压力 /Maximum Oil Pressure	600			(1)
正常工作范围 /Normal Operating Range	200 — 600			(1)

压力限制(kPa) /Pressure Limits (kPa)	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
最小滑油压力 /Minimum Oil Pressure	110		170	110	170
最大滑油压力 /Maximum Oil Pressure	600				
正常工作范围 /Normal Operating Range	200 — 600				

注 (1)：参见安装/工作手册。

/Note (1): Refer to Installation / Operating Manual

4.2 燃油压力 Fuel pressure

最小燃油压力/Minimum fuel pressure:

-正常工作不包括起动阶段，下列条件的最大值规定了除了 2D 型的最小绝对压力：

/Normal operation, i.e. excluding starting phase, the minimum (absolute) pressure is defined for all models except 2D by the highest of the following conditions:

20 kPa 绝对压力，

/20 kPa absolute,

35% 的大气压力，

/35% of atmospheric pressure,

使用燃油的蒸汽压 7kPa，

/7 kPa above the vapour pressure of the fuel used,

对应于蒸气体积与液体体积之比大于 0.30 的燃油压力。

/Fuel pressure corresponding to a Vapour volume over Liquid volume ratio of 0.30.

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Arriel 2D: 参见安装/工作手册。

For Arriel 2D: Refer to Installation / Operating Manual.

-启动阶段或再起动（相对压力）/During starting phase or at relight (relative pressure):

- 除 2S2 所有型号/For all models except 2S2: 25kPa 相对压力/25kPa relative pressure
(例如低于大气压力 25 kPa) /(i.e. 25 kPa below atmospheric pressure)
- 对于 Arriel 2S2/For Arriel 2S2: 20kPa 相对压力/20kPa relative pressure
(例如低于大气压力 20 kPa) /(i.e. 20 kPa below atmospheric pressure)

最大燃油压力/Maximum fuel pressure:

除 Arriel 2D 外所有型号在所有的运行阶段小于或等于 150 kPa (相对压力)。

/Less than or equal to 150 kPa (relative pressure), in all operating phases, for all Models except Arriel 2D.

Arriel 2D 外所有型号在所有的运行阶段小于或等于 180 kPa (相对压力)。

/Less than or equal to 180 kPa (relative pressure), in all operating phases, for Arriel 2D.

5、安装保证/Installation Assumptions:

参见安装手册/See Installation Manual

6、派遣限制/Dispatch Limitation:

除了 Arriel 2S1 and Arriel 2D/All Models except Arriel 2S1 and Arriel 2D:

所有的设备和发动机系统在航空器起飞之前必须功能正常。飞行中发生失效的所有设备和发动机系统在下次起飞前应更换或修理。

/All engine systems and equipment must be functional prior to aircraft take-off. Any engine system or equipment the failure of which would occur in flight shall be replaced or repaired prior to commencement of next flight.

Arriel 2S1:

有设备失效的派遣时间限制条件由相关飞机制造厂批准的 MMEL 给定。对于安装 Arriel 2S1 涡轴发动机的情况，发动机制造厂的派遣建议在安装手册 § 15 给出。

/Conditions for time limit dispatch of equipments in failure are given in approved MMEL of concerned aircraft manufacturer. Engine manufacturer dispatch recommendations for equipment of Arriel 2S1 turboshaft engine are listed in Installation Manual §15.

Arriel 2D:

发动机派遣形式分析已完成，参见安装手册。

/An Engine Dispatch Configuration analysis has been performed and is referenced in the Installation Manual.

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IV 操作和服务说明/Operational and Service Instructions

文件/ Document	Arriel 2B	Arriel 2B1	Arriel 2B1A	Arriel 2D
安装图纸和手册（1） /Installation Drawing and Manual (1)	X 292 M0 001 2	X 292 N5 001 2	X 292 P4 001 2	X 292 R1 001 2
性能手册 /Performance Brochure	X 292 M5 001 9	X 292 N5 002 9	X 292 P4 001 9	AA049088
维护手册 /Maintenance Manual	X 292 M5 450 2	X 292 N5 450 2	X 292 P4 450 2	X 292 R1 450 2
维修手册 /Repair Manual	X 292 M5 300 2	X 292 N5 500 1		X 292 R1 500 2
服务信件和服务通报 /Service letters and Service Bulletins	参考SB和SL指南 /Refer to SB and SL directory			

注 (1) : 安装手册第 15 章提供了操作说明。

/Note (1) Operating Instructions are provided in Installation Manual Chapter 15.

文件/ Document	Arriel 2C	Arriel 2C1	Arriel 2C2	Arriel 2S1	Arriel 2S2
安装图纸和手册 /Installation Drawing and Manual (1)	X 292 M1 001 2	X 292 N4 001 2	X 292 N6 404 1	X 292 L0 001 1	X 292 P5 001 2
性能手册 /Performance Brochure	X 292 M1 001 9	X 292 N4 002 9	X 292 N6 002 9	X 292 L0 001 9	X 292 P5 001 9
维护手册 /Maintenance Manual	X 292 M1 450 2	X 292 N4 450 2	X 292 N6 450 2	X 292 L0 301 2	X 292 P5 451 2
维修手册 /Repair Manual	X 292 M1 500 2	X 292 N4 500 2	X 292 N6 500 2	X 292 L0 500 2	X 292 P5 550 2
服务信件和服务通报 /Service letters and Service Bulletins	参考SB和SL指南 /Refer to SB and SL directory				

注 (2) : 安装手册第 15 章提供了操作说明。

/Note (1) Operating Instructions are provided in Installation Manual Chapter 15.

V 注释/Notes

注 1: Arriel 2B, 2B1, 2B1A, 2D 限安装于单发。

/Note 1: Arriel 2B, 2B1, 2B1A, 2D installation is approved for single-engine application only.

注 2: Arriel 2C, 2C1, 2C2, 2S1, 2S2 发动机限安装于多发。

/Note 2: Arriel 2C, 2C1, 2C2, 2S1, 2S2 installation is approved for multi-engine application only

注 3: 进气道:

-直升机进气道设计应该防止瞬时吸冰、雪和超过大量的水, 定义在安装和工作手册中。

-应安装安装和工作手册中要求的保护网, 用来限制外物吸入发动机。

/Note3: Air intake:

- The helicopter air intake design shall be such as to prevent instantaneous ingestion of ice, snow and water in excess of maximum quantities defined in the Installation and Operating Manual.

- A protective grid as defined in the Installation and Operating Manual shall be installed to limit the ingestion of foreign matters in the engine.

注 4: Arriel 2B, 2B1, 2B1A, 2D 发动机不批准在结冰条件下使用 Eurocopter AS 350 B3 / EC130 砂滤器 P/N 704 A 41 650 010。

/Note4: The Arriel 2B, 2B1, 2B1A, 2D are not approved for operation in icing conditions with Eurocopter AS 350 B3 / EC130 sand filter P/N 704 A 41 650 010.

注 5: Arriel 2B1A 型发动机在结冰条件下 (JAR E 780) 使用的的能力仅当装配在直升机进口时, 参考 Z11 MB1-6860-0 进气道和 Z11 MB1-6850-30 进气罩, 而予以说明。

/Note 5: The Arriel 2B1A capability to operate in icing conditions (JAR E 780) has been addressed only when fitted with helicopter air intake reference Z11 MB1-6860-0 for the inlet duct and Z11 MB1-6850-30 for the inlet screen.

注 6: 电子控制单元不能被安装在指定火区, 安装条件规定在安装手册中。

/Note 6: The electronic control unit must not be installed in a dedicated fire zone. The installation conditions are defined in the Installation Manual.

注 7: 对于机组在发动机失效情况的训练, Arriel 2C, 2C1, 2C2, 2S1, 2S2 的电子控制系统提供了“训练”功能, 这一功能的特性参考安装手册。

/Note 7: For Arriel 2C, 2C1, 2C2, 2S1, 2S2 the electronic control system provides a “TRAINING” function for training crew in an engine failure situation . Refer to the Installation Manual for the characteristics of this function.

注 8: 对于除了 Arriel 2D 外的所有型号已经生效的 EECU 软件依据 DO 178 A, level 1, Arriel 2D 为 DO 178 B, level A。

/Note 8: The software of the EECU has been validated according to DO 178 A, level 1, for all Models except Arriel 2D, and DO 178 B, level A for the Arriel 2D.

注 9: 在安装手册中提供了使用、启动和再点火包线。

/Note 9: The operating / starting /relight envelope is provided in the Installation Manual.

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注 10：电磁干扰/闪电（详细参考安装手册）EMI

/Note 10: lightning (Refer to Installation Manual for details.)

根据下列规范以认可的级别/Validated levels have been tested according to the following standards:

	<u>所有型号, 除了/All Models, except:</u> Arriel 2B1/2B1B with Modification TU169 (EECU Goodrich EMC101); Arriel 2D	<u>Arriel 2B1/2B1B with:</u> Modification TU169 (EECU Goodrich EMC101)	<u>Arriel 2D</u>
感应信号的灵敏性 /Induced signal susceptibility	DO-160C 第19部分, Z类 /DO-160C Section 19, Category Z	DO-160D 第19部分, Z类 /DO-160D Section 19, Category Z	DO-160E 第19部分, ZC类 DO-160E Section 19, Category ZC
无线电频率的灵敏性 /Radio Frequency susceptibility	DO-160C 第20.4部分, Y类 美军标461C -CS01, CS02, CS06, RS02, RS03 /DO-160C Section 20.4, Category Y ; MIL STD 461C -CS01, CS02, CS06, RS02, RS03	DO-160D 第20部分, Y类 /DO-160D Section 20, Category Y	进行/Conducted: DO-160E 第20部分, G类 安装/工作手册 /DO-160E, Section 20, Category G extended as per Installation/Operating 辐射/Manual Radiated: /DO-160E 第20部分, L类 DO-160E Section 20, Category L
发射无线电频率的能量 /Emission of Radio Frequency energy	DO-160C 第 21 部分 Z类 美军标461C -CE01, CE03, CE07, RE02 /DO-160C Section 21, Category Z ; MIL STD 461C -CE01, CE03, CE07, RE02	DO-160C 第 21 部分 H类 DO-160D Section 21, Category H	DO-160E 第 21 部分 H类 安装/工作手册 DO-160E, Section 21, Category H extended as per Installation/Operating Manual
闪电感应的瞬时敏感性 /Lightning induced transient susceptibility	DO-160C 第 22 部分 DO-160C Section 22	DO-160D 第 22 部分 DO-160D Section 22	DO-160E 第 22 部分 DO-160E, Section 22

注 11：对于 Arriel 2S1 and 2S2，动力涡轮超速停车设备，之前是作为选装设备，现在作为基本型号设计的一部份并已安装在所有放行的发动机上

/Note 11: For Arriel 2S1 and 2S2, the power turbine overspeed shut-down device, previously available as an option, is now part of the basic Type Design and has been fitted to all the delivered engines.

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注 12 : EASA 批准的持续适航文件中的适航限制部分相应的在“发动机维护手册”中第 5 章“适航限制”中声明。

/Note 12: The EASA approved Airworthiness Limitations Section of the Instructions for Continued Airworthiness is published in the applicable "Engine Maintenance Manual" document, chapter 5 "Airworthiness Limitations".

注 13: Arriel 2S1 和 Arriel 2S2 发动机由 Turbomeca 公司在法国组装, 也可以在 Turbomeca USA (前身是 Turbomeca 发动机公司) 授权下在美国组装。

-在法国组装的发动机装有按照法国规章的识别牌。

-在美国组装的发动机装有按照 FAR 规章的识别牌, 并且在序号前加上前缀“TEC”或“TM USA”。

/Note 13: Arriel 2S1 and Arriel 2S2 engines are assembled by Turbomeca in France and under licence by Turbomeca USA (formerly Turbomeca Engine Corporation) in the USA.

- Engines assembled in France have an identification plate in accordance with the regulations applicable in France,

- Engines assembled in the USA have an identification plate in accordance with the FAR regulations and the prefix "TEC" or "TM USA" is added to the serial number.

----结束----

----END----