

型号认可证数据单

THE VALIDATION DATA SHEET

编号/No: VTC0256E

版次/Revision: 1

型号/Type:

Arrius 1A

Arrius 1A1

批准人/Approved By:



职务/Title: Director General of CAAC-AAD

日期/Date: 2023年04月21日

本数据单是型号认可证(编号: **VTC0256E**)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: **VTC0256E**), 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:

Safran Helicopter Engines

64510 BORDES 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	No. VTC0256E, 版次1, 2023年04月21日	EASA TCDS No. E.080 Issue 4, 25 March 2021
历史 History	No. VTC0256E, 版次0, 2011年5月12日	EASA TCDS No. E.080 Issue 1, 15 December 2006

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 1/Revision 1	1. 名称由Turbomeca变更为Safran Helicopter Engines/ Name change from Turbomeca to Safran Helicopter Engines 2. 发动机审定基础变更 (Arrius 1A1型号): 增加CS-E 25; 澄清CS-E 20(a) 条款对应的CS-E修正案/Change in the Engine Certification Basis: CS-E 25 is added; Clarification of the CS-E Amendment for the CS-E 20(a) requirement (Arrius 1A1) 3. 更新3号喷气燃料标准/ Update of No.3 Jet Fuel Standard 4. 修改部分文字错误/Modification of some text errors	

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:

欧盟航空安全局/EASA

4. 型号合格证持有人/Type Certificate Holder:

Safran Helicopter Engines

64510 Bordes France

DOA-ref: EASA.21J.070

Until 18 July 2016 Turbomeca

After 18 July 2016 Safran Helicopter Engines

5. ETOPS:

不适用/NA

6. CAAC专用要求/CAAC 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 数据

SECTION 2 DATA

1. 审定基础/Certification basis

适航标准/Airworthiness Standard:	JAR-E 第6版1981年8月28日, 第1, 2, 4部分 (基于BCAR C 第13版: C1-1, C1-2, C4-1, C4-2, C4-3, C4-6, C4-7章) 按照DGAC, 法国民航局要求加上蓝页N°791和798, 参考1984年7月30日53792SFACT/TC和1988年2月5日53118 SFACT/TC。 对于Arrius 1A1还包含: CS-E 20(a): 发动机构型与界面 (CS-E初始版) CS-E 25 (CS-E第4修正案) /JAR-E Change 6 dated 28/08/81, Section 1,2,4 (based on BCAR C issue 13: chap. C1-1, C1-2, C4-1, C4-2, C4-3, C4-6, C4-7) plus Blue Paper N°791 and 798 as per letter from DGAC, French Vicil Aviation Authority, ref. 53792 SFACT/TC dated 30/07/84 and 53118 SFACT/TC dated 05/02/88 For Arrius 1A1 in addition: CS-E 20(a): Engine configuration and interface (CS-E Initial Issue) CS-E 25 (CS-E Amendment 4)
环境标准/Environmental Standard:	环保按照规章 (EC) 21 A.18(b) 1702/2003 / Environmental protection as per 21 A.18(b) of regulation (EC) 1702/2003.

2. 技术特性/Technical Characteristics

型号设计定义/TYPE DESIGN DEFINITION	Arrius 1A P/N 0 319 00 513 0 Arrius 1A1 P/N 0 319 00 530 0
描述/DESCRIPTION	A1和A1发动机是带有自由涡轮的350kW级别的涡轮发动机。Arrius 1系列发动机是由环形进气道, 单级涡轮驱动的离心压气机, 回流环形燃烧室, 驱动前部减速齿轮箱的带有通轴的单级自由涡轮和排气管组成。减速齿轮箱单元还包括被燃气发生器驱动的附件齿轮箱。控制系统是带有人工备份的发动机电子控制单元。 The Arrius 1A and 1A1 engines are free-turbine turboshaft engines of the 350kW category. Arrius 1 engine consists of annular air intake, a centrifugal compressor driven by a single-stage turbine, a reverse flow annular combustion chamber, a single stage free turbine with a through-shaft which drives a reduction gear assembly located at the front, and an exhaust pipe. The reduction gear unit casing also includes the accessory gearbox driven by the gas generator. The control system features an engine electronic control unit (EECU), with a manual back-up. 起动发电机不是发动机型号设计定义的一部分。

	Starter-generator is not part of the engine type definition.		
设备/EQUIPMENT	发动机安装所需要的设备都包含在型号设计定义中。 Engine equipment is specified by the applicable Type Design Definition.		
尺寸/DIMENSIONS	型号/Model		Arrius 1A(*)/1A1
	长度/Length (m)	带排气管/with exhaust pipe	1.601
		不带排气管/without exhaust pipe	0.793
	高度/Height (m)		0.586
	宽度/Width (m)		0.436
	(*)带有TU14设计更改 / (*) With TU14 design change embodied		
干重/DIMENSIONS	干重/Dry Weight (Kg)		102.7
	额定值/Ratings kW		
	2-1/2分钟OEI/2-1/2 minute OEI	Arrius 1A	388
		Arrius 1A1	415
	30分钟/连续OEI/30 min/Continuous OEI	Arrius 1A	357
		Arrius 1A1	386
	起飞/Takeoff	Arrius 1A	340
		Arrius 1A1	343
	最大连续/Maximum Continuous	Arrius 1A	296
		Arrius 1A1	305
	注1：发动机额定值对应下述条件下最小值： / Note 1: Engine ratings correspond to minimum values defined under the following conditions: ➢ 静态，海平面标准条件/static, sea level standard conditions (15°C, 1013hPa) ➢ 发动机装有钟形进气口的校准试验台 P/N 6.203.13.726.0/engines equipped with calibrated test bed air intake bellmouth P/N 6.203.13.726.0 ➢ 发动机装有进气道的校准试验台 P/N 6.203.18.725.0/engines equipped with calibrated test bed air intake casing P/N 6.203.18.725.0 ➢ 使用排气管 P/N 0.319.77.759.0/use of exhaust pipe P/N 0.319.77.759.0 ➢ 无引气/no air bleed ➢ 除了那些发动机运行所需要的设备没有任何附件提供拉力/no power drawn by any accessories other than those required for engine operation ➢ 燃油低热值/fuel low Heat Value: 43136kJ/kg ➢ 输出轴转速/output shaft rotation speed: 6016 rpm (100%)		
	注2：详细性能曲线在安装/运行手册相关部分中提供。 /Note 2: Detailed performance curves are provided in the relevant Installation/Operating Manuals.		
控制系统/CONTROL SYSTEM	控制系统是带有人工备份单通道电子发动机控制系统。进一步信息请参考安装/运行手册。		

	/The control system is a single channel Electronic Engine Control Unit with manual back up. Refer to the Installation / Operating Manuals for further information.		
液体（燃油/滑油/添加剂） /FLUIDS (FUEL/OIL/ADDITIVES)	参见安装/运行手册相关部分。 /Refer to applicable Installation/Operation Manual.		
飞机附件驱动/ AIRCRAFT ACCESSORY DRIVES	名称/Designation	起动发电机/Starter Generator	
	旋转方向 面向盘/Rotation direction Facing pad		CCW
	转速/Rotation Speed (rpm)		11479
	最大稳态/Maximum Steady state (kW)		(*)
	最大过载扭矩/Maximum torque at overload (daN.m)		25
	最大悬挂静力矩/Maximum static overhung moment(daN.m)		25
	(*)最大稳态机械关断 /Maximum Steady state mechanical off-take: - Arrius 1A - 在所有额定值下是4.8kW/4.8kW at all ratings - Arrius 1A1 - AEO额定值（最大连续，起飞）：不降低额定值时是3kW /AEO rating (Max Continous, Take off): 3 kW without de-rating 如果机械关断在3kW到6kW之间，应用性能手册X 319 U1 100 2修正性能和额定值，如果高度高于10000英尺，将被限制到4.8kW。 连续OEI额定值：不降低额定值时是4.8kW。 / If mechanical off-take is comprised between 3kW and 6kW, corrections to performance and ratings stated in Performance Booklet X 319 U1 100 2 shall be applied, and it shall be limited to 4.8kW if altitude is higher than 10000 ft. Continuous OEI rating: 4.8kW without de-rating. 如果机械关断在4.8kW到6kW之间，应用性能手册X 319 U1 100 2修正性能和额定值，如果高度高于10000英尺，将被限制到4.8kW。 / If mechanical off-take is comprised between 4.8kW and 6kW, corrections to performance and ratings stated in Performance Booklet X 319 U1 100 2 shall be applied, and it shall be limited to 4.8kW if altitude is higher than 10000 ft. - 2 1/2分钟OEI额定值：不降低额定值是6kW，如果高度高于10000英尺，被限制到4.8kW。 /2 1/2min OEI rating: 6kW without de-rating, and limited to 4.8kW if altitude is higher than 10000ft.		
	注/Notes	-CCW: 逆时针/CCW: counter clockwise - 驱动附件的功率驱动器转动方向是指从功率驱动器外面观看。 / The rotation direction of the power drivers for the accessories is indicated considering the power drive seen from the outside.	

最大允许的引气/ MAXIMUM PERMISSIBLE AIR BLEED EXTRACTION	直升机使用P3引气, 标准海平面条件下最大流量是: 在起飞时70 g/s。 /P3 air bleed for helicopter use, maximum flow rate at standard sea level conditions: 70 g/s at Take-off rating. 更多的细节请参照安装手册。 /For further details, see Installation Manual.
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3. 使用限制/ Operational Limitations

温度限制 /TEMPERATURE LIMITS	涡轮排气温度 /Turbine Gas Temperature (°C)	2-1/2分钟 OEI/2-1/2 minute OEI	Arrius1A	870
			Arrius1A1	886
		30分钟/连续 OEI/30 min/ Continuous OEI	Arrius1A	800
			Arrius1A1	812
		起飞/Takeoff	Arrius1A	800
			Arrius1A1	773
		最大连续/Maximum Continuous	Arrius1A	765
			Arrius1A1	749
		启动（无限制） /Starting (unlimited)	Arrius1A	765
			Arrius1A1	765
	启动（限制5秒） /Starting (limited to 5 sec.)	Arrius1A	870	
		Arrius1A1	870	
		如果超过限制参考安装手册要求处理。 /Refer to Installation Manual for required action of limits are exceeded.		
	燃油温度 /Fuel Temperature	参考相关安装/运行手册。 /Refer to relevant Installation / Operating Manuals.		
	滑油温度 /Oil Temperature	最小起动温度：依据滑油说明书，Arrius 1在-50°C和-30°C之间， Arrius 1A1在-40°C和-30°C之间。 /Minimum for starting: between -50°C and -30°C for Arrius 1A, -40°C and -30°C for Arrius 1A1, according to oil specification. 参照安装手册。 /Refer to Installation Manual.		
		最小功率要求： /Minimum for power application:		0°C with 3 cst oils
		10°C with 5 cst oil		
最大运行温度：80°C到110°C，依据高度和燃油类型。 /Maximum operating temperature: 80°C to 110°C depending on altitude and type of fuel. 参照安装手册。 /Refer to Installation Manual.				
压力限制 /PRESSURE LIMITS	燃油压力 /Fuel pressure	参见安装/运行手册 /See installation / Operating Manuals		
	滑油压力	最大/Maximum: 1MPa		

	/Oil pressure (hPa)	最小: N1大于65%时是170kPa /Minimum: 170kPa at N1 greater than 65%				
最大/最小允许转速 /Maximum / Minimum Permissible Rotor Speeds	燃气发生器转速 /Gas generator speed (N1)	2-1/2分钟 OEI /2-1/2 minute OEI	Arrius 1A	rpm	56140	
				%	103.7	
		Arrius 1A1	rpm	56347		
			%	104.1		
		30分钟/连续OEI /30 min / Continuous OEI	Arrius 1A	rpm	55300	
				%	102.2	
			Arrius 1A1	rpm	55452	
				%	102.5	
		起飞 / Takeoff	Arrius 1A	rpm	54685	
				%	101	
			Arrius 1A1	rpm	54375	
				%	100.5	
		最大连续/Maximum Continuous	Arrius 1A	rpm	53285	
				%	98.5	
			Arrius 1A1	rpm	53397	
				%	98.7	
		瞬态超速/Transient overspeed (<5 sec)	Arrius 1A	rpm	56280	
%	104					
Arrius 1A1	rpm		56498			
	%		104.4			
100%为 54117 rpm /With 100% = 54117 rpm						
注 /Note:	最小稳定速度/Minimum stabilized speed: 35176 rpm (65%)					
	如果超过限制参考安装手册要求处理。 /Refer to Installation Manual for required action if limites are exceeded.					
动力涡轮转速 /Power turbine speed (N2)(%)	最大稳态 / Maximum stabilized			104		
	最大5秒瞬态 / Maximum transient 5 sec.			108		
	最小稳态 / Minimum stabilized			91		
	最小5秒瞬态 / Minimum transient 5 sec.			83		
	100% 为 45438 rpm, 相当于功率提取时6016 rpm / With 100%=45438 rpm corresponding to 6016 rpm at power off/take.					
	注/ Notes:	最小稳定地面慢车速度/Minimum stabilized ground idle speed: 40000 rpm (88%)				
		起动期间, 禁止在70-85%的区间下持续运行。 /During starting, continuing operation within the 70 to 85% range is prohibited.				
		如果超过限制参考安装手册要求处理。 Refer to Installation Manual for required action of limites are exceeded.				

扭矩限制 /Torque Limits (daN)	2-1/2分钟 OEI/2-1/2 minute OEI	Arrius 1A/1A1	68
	30分钟/连续 OEI/30 min / Continuous OEI	Arrius 1A/1A1	63
	起飞 / Takeoff	Arrius 1A/1A1	63
	最大连续 / Maximum Continuous	Arrius 1A/1A1	56
	瞬时超扭 / Transient overtorque (<20 sec.)	Arrius 1A/1A1	77
安装假设 /Installation Assumptions :	详细资料参考安装/运行手册。 Refer to Installation / Operating Manuals for details.		
放行限制 / Dispatch Limitations :	所有发动机系统和设备在飞机起飞前必须是功能完好的。任意系统或设备在飞行中失效, 必须更换或在下次飞行之前修理。 /All engine systems and equipment must be functional prior to aircraft take-off. Any engine system or equipment failure which would occur in flight shall be replaced or repaired prior to commencement of next flight.		

4. 使用和服务说明/ Operational and Service Instructions

安装手册/Installation Manual	Arrius 1A/1A1	X 319 D6 001 2
维修手册/Maintenance Manual	Arrius 1A	X 319 D6 300 1
	Arrius 1A1	X 319 U1 451 2
大修手册/Overhaul Manual	Arrius 1A	X 319 H6 500 2
	Arrius 1A1	(*)
	(*)大修必须按照SAFRAN HELICOPTER ENGINES颁布的大修手册进行。 /Overhaul must be done by SAFRAN HELICOPTER ENGINES until Overhaul Manual is published.	

5. 注释 / Notes

注1 / NOTE1 外物吸入 / Ingestion of foreign matter:	Arrius 发动机没有进行试验评估外物吸入。飞机机身制造人有责任保护发动机防止外物从飞机进气道吸入。在发动机安装批准前, 飞机制造厂商必须证明飞机装置能够阻止发动机外物吸入。 /The Arrius engines were not tested to evaluate the effects of foreign object ingestion. It is the airframer's responsibility to protect the engine from foreign object ingestion through the design of the aircraft air intake. The aircraft manufacturer must substantiate that the aircraft installation prevents foreign object ingestion by the engine, prior to the approval of the engine installation. Arrius发动机没有防冰系统。当结冰时, 只有安装飞机进气道零件 (件号为355A543533) 时, 才能符合发动机适航要求。 /The Arrius engine does not have anti-icing provisions. They comply with the engine airworthiness requirements during icing conditions when aircraft air intake Part Number 355A 543533 is installed.	
注2 / NOTE2 EECU箱 / EECU box	安装条件/ Installation	箱子应该安装在机身火区外。 / The box shall be installed in the airframe outside the

	conditions:	fire zone.
		其他安装条件参考安装手册。 / Refer to Installation Manual for others installation conditions.
	闪电防护：参考安装手册。 / Lightning protection: refer to installation Manual.	
	电磁干扰：具体试验参考安装手册。 / Electromagnetic interferences: tests carried out are specified in the Installation Manual.	
	软件：软件必须经过开发和试验，参考文件RTCA DO 178A/EUROCAE ED-12A to level 1。 / Software: The software has been developed and tested and the corresponding documentation developed according to the recommendations of document RTCA DO 178A/EUROCAE ED-12A to level 1.	
注3 / NOTE3 振动 / Vibrations:	探针被安装在涡轮机匣托架内：参见安装手册。 / A probe can be mounted on the turbine case bracket: see Installation Manual.	
注4 / NOTE4 超速/ Overspeed:	发动机有一个电子自由涡轮超转限制系统。 /The engine has an electronic free turbine overspeed system limitation.	
注5 / NOTE5 “训练”功能 / “Training” function	电子控制系统提供了一个“训练”功能，在发动机失效条件下用于训练机组。参见安装/运行手册。 /The electronic control system provides a “Training” function for training crews in an engine failure condition. See the Installation / Operation Manual for the characteristics of this function.	