



MINISTRY OF TRANSPORT OF THE RUSSIAN FEDERATION
FEDERAL AGENCY OF TRANSPORT AVIATION
(FATA)

DATA SHEET
TYPE CERTIFICATE

№ FATA-01044E

Engine
ARRIUS 2

Models:

- Arrius 2B2
- Arrius 2K2
- Arrius 2G1
- Arrius 2F
- Arrius 2R

Issue 01
19 October 2018

Page	01	02	03	04	05	06
Issue	01	01	01	01	01	01
Date	19.10.2018	19.10.2018	19.10.2018	19.10.2018	19.10.2018	19.10.2018

Title	Issue	Date
Type Certificate Data Sheet № FATA-01044E	01	19.10.2018

1. Manufacturer – Type Certificate Holder till 18 of July 2016: Turbomeca;
after 18 of July 2016 r.: Safran Helicopter Engines, 64511 Bordes, France

2. Initial certification data Type Certificate (TC) № CT258-AMД., issued by IAC-AR on 28.06.2006

3. Engine description

Engine is a turboshaft engine which is consisted of an annular air intake, a centrifugal compressor driven by a single stage turbine, an annular reverse flow combustion chamber, and a single stage free power turbine with through shaft driving a reduction gearbox located at the front.

4. Certification Basis (CB)

Model	Certification Basis	Environmental requirements	List of CB requirements versus which equivalent compliance is demonstrated	Special Technical Conditions
Arrius 2B2	Aviation Regulations AP-33, issue 1994	ICAO Annex 16, Volume II, Part II, issue 2	For Arrius 2B2 JAR E 740; For Arrius 2K2/2G1 JAR E740 (c), JAR E 740 (f) (4)(i); 33.87, 33.88	33.28 33.29 (c) 33.87 (f)
Arrius 2K2				
Arrius 2F				
Arrius 2G1		ICAO Annex 16, Volume II, Part II, issue 5		
Arrius 2R		CS-34 Amendment 1, dated 29th January 2013 in accordance with CS-E1010 Fuel Venting Environmental protection requirements of ICAO Annex 16, Volume II, Part II, Chapter 2 Amendment 7 effective 17th November 2011	—	33.28, 33.29 (c), 33.88

5. Type design

It is defined by the following design and operational documents valid on the date of issuance of the Type Certificate or later changes introduced in due order:

Модели	Arrius 2B2	Arrius 2K2	Arrius 2G1	Arrius 2F	Arrius 2R
Type Design Definition	0 319 00 720 0	0 319 00 620 0	0 319 00 633 0	0 319 00 800 0	R 319 00 900 0
Installation and Operation Manual	X319N3 001 2	X319N0 001 2	X 319 R4 002 2	X319L6 001 2	X 319 R5 003 2
Maintenance manual	X319N3 001 2	X319N0 001 2	X319R4 002 2	X319L6 001 2	X 319 R5 460 2
Performance Brochure	X319N3 002 2	X319N0 002 2	X 319 R4 003 1	—	X 319 R5 001 2
– usual fuels	—	—	—	X319L6 002 9	
– alternative fuels	—	—	—	X319L6 004 9	
– normal fuels (c Tf39*)	—	—	—	X 319 L6 005 9	

Title	Issue	Date
Type Certificate Data Sheet № FATA-01044E	01	19.10.2018

Модели	Arrius 2B2	Arrius 2K2	Arrius 2G1	Arrius 2F	Arrius 2R
– alternative fuels (with Tf39)	—	—	—	X319L6 006 9	
– Maintenance Manual	X 319 N3 451 2	X319N0 452 2	X319R4 450 2	X319L6 301 2	X 319 R5 460 2
– Repair Manual	X 319 N3 500 2	X 319 N0 500 2	X 319 R4 500 2	X319L6 500 2	X 319 R 500 2

Note: * - with HMU with the increased fuel consumption

6. Engine Appliances:

List of engine equipment is stated in the correspondent document: Type Design Definition.

7. General Dimensions, [mm]:

Модели	Arrius 2B2	Arrius 2K2	Arrius 2G1	Arrius 2F	Arrius 2R
– Overall Length	1158,0	973,0	973,0	1168,0	934
– Overall Height	690,0	638,0	641,0	674,0	676
– Overall Width	518,0	538,0	482,0	489,0	553
Dry Weight, [kg], not more than:	114,3	112,8	113,8	104	119,9

8. Ratings and technical data:

Ratings - power [kW]:					
– 30-sec, OEI	557	—	—	—	—
– 2-min, OEI	544	—	—	—	—
– 2,5-min, OEI	—	504	518,4	—	—
– Continuous, OEI	485	504	477	—	—
– 5-min, Take-off	480	504	426	322	352
– Maximum Continuous	432	453	426	322	323

Note:

The power levels specified article 7. refer to the minimum values and are set for the below conditions:

- MC ISA conditions at sea level, on the bench;
- Without air bleed for the needs of the aircraft;
- Without loss at inlet or exhaust;
- No loss on installation;
- Output shaft rotation speed: $N_B=6252$ 1/min (106%) – Arrius 2B2;
 $N_B=6360$ 1/min (106%) – Arrius 2K2;
 $N_B=6000$ 1/min (100%) – Arrius 2F/2G1.
 $N_B=5610$ 1/min(100%) – Arrius 2R

9. Engine control system:

Models	Type system
Arrius 2B2	Single channel electronic system with manual backup
Arrius 2K2	
Arrius 2G1	
Arrius 2F	Hydromechanical control system with manual backup
Arrius 2R	Dual channel electronic system with manual backup

Note:

- The software for the electronic engine control (model Arrius 2B2 / 2K2 / 2G1) has been developed and tested in accordance with the requirements of the categories of criticality of functions (level 1) of RTCA / DO 178A.
- for the model of the Arrius 2B2 engine, the software version L11G000505 has been introduced, which was developed according to the Performance Package after the Half of the Service Life accumulation (Midlife Efficiency Package (MEP))

Title	Issue	Date
Type Certificate Data Sheet № FATA-01044E	01	19.10.2018

10. Applicability of fuel grades and additives:

Foreign grades	Refer to Installation and Operation Manual
Russian grades	– fuel: TC 1, PT (GOST10277-86); – anti-ice additives: Fluid И (GOST 8313-88), Fluid И-М (TU 6-10-1458-79). Maximum concentration - 0,15% of volume, minimum concentration - 0,10% of volume.

11. Oil:

For the approved types of oil grades refer to Installation and Operation Manual.

12. Aircraft Accessories drive

Name of accessory	Engine model	Rotation direction	Rotation speed [1/min]	Maximum continuous power, [kW]	Maximum torque in overload, [N-m]	Maximum static overhang (N.m) [N-m]	Fuse shaft breakaway torque [N-M]
Starter-generator	Arrius 2B2	Clockwise	12334	—	25	25	95
	Arrius 2K2		12335	—	25	7	95
	Arrius 2G1		12335	—	25	7	95
	Arrius 2F		12334	5,7	25	25	77
	Arrius 2R		12334	6,9	25	25	95
Stan-by drive	Arrius 2K2		4632	—	15	11	45

13. Air Bleed Extraction:

Модели	
Arrius 2B2	4.5% of the intake air flow to the engine
Arrius 2K2	5,48% of the intake air flow to the engine
Arrius 2G1	
Arrius 2F	70 g/sec - on takeoff mode at sea level
Arrius 2R	70 g/sec - on takeoff mode at sea level

Models	Arrius 2B2	Arrius 2K2	Arrius 2G1	Arrius 2F	Arrius 2R
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14. Gas Generator Exhaust Temperature (T45) Limits [°C]:

During start:					
– For an unlimited duration	819	819	819	800	800
– Maximum overtemperature (<5 sec)	910	(1)	(1)	—	—
– Maximum overtemperature (<20 sec)	—	—	—	870 (< 20 sec)	870 (< 5 sec)
In flight:					
– 30-sec, OEI	1024	—	—	—	—
– 2-min, OEI	994	—	—	—	—
– 2,5-min, OEI	—	990	990	—	—
– Continuous, OEI	942	934	938	—	—
– 5-min, Take-off	897	929	932	870	865
– Maximum Continuous	879	882	887	830	829 ⁽²⁾

Note:

(1) 867° C – without failure indication; 910° C – with failure of P0 or T1;

(2) Maximum intended temperature exceedance 882 °C (<20 sec)

Title	Issue	Date
Type Certificate Data Sheet № FATA-01044E	01	19.10.2018

15. Fuel temperature, [°C]:

– Maximum temperature	see Installation Manual				
– Minimum temperature for engine start	see Installation Manual				
– Use of fuel System Icing Inhibitors at fuel temperature	*	≤4	≤4	≤minus 15	≤minus 20

Note: * - for temperature value refer to Installation Manual № X 319 N3 001 2.

16. Oil temperature, [° C]:

Models	Arrius 2B2	Arrius 2K2	Arrius 2G1	Arrius 2F	Arrius 2R
Minimum at start:					
– for oil with a kinematic viscosity of 5 cSt and 3.9 cSt	minus 30	minus 30	minus 30	**	minus 30
– for oil with a kinematic viscosity of 3 c _{CT}	minus 50	minus 50	minus 50	**	minus 50
Minimum before power on:					
– for oil with a kinematic viscosity of 5 cSt and 3.9 cSt	10	10	10	10 (at 5 cSt)	minus 50
– for oil with a kinematic viscosity of 3 c _{CT}	0	0	0	0	minus 50
Maximum	110	110	110	110	minus 50

Note:

** - refer to Installation Manual.

17. Operating and installation limitations

Models	Arrius 2B2	Arrius 2K2	Arrius 2G1	Arrius 2F	Arrius 2R
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Allowable rotation speed, [rpm / %]:

Maximum allowable rotor speed of the gas generator (N1):					
– 30-sec, OEI	57081 / 105,5	—	—	—	—
– 2-min, OEI	56413 / 104,2	—	—	—	—
– 2,5-min, OEI	—	56331 / 104,1	56409 / 104,2	—	—
– Continuous, OEI	55187 / 102	55006 / 101,6	55094 / 101,8	—	—
– Take-off	54105 / 99,9	55006 / 101,6	55094 / 101,8	54768 / 101,2	54872 / 101,4
– Max. continuous	53564 / 98,9	53706 / 99,2	53795 / 99,4	53956 / 99,7	54066 / 99,9
– transient (5sec)	55187 / 102	57689 / 106,6	57689 / 106,6	—	—
– transient (20sec)	—	—	—	56065 / 103,6	56065 / 103,6
Minimum stabilized rotor speed (N1):					
	32470 / 60	32470 / 60	32470 / 60	34094 / 63	34094 / 63

Note:

100% N1 = 54117 [1/min]

Title	Issue	Date
Type Certificate Data Sheet № FATA-01044E	01	19.10.2018

Models	Arrius 2B2	Arrius 2K2	Arrius 2G1	Arrius 2F	Arrius 2R
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Maximum allowable turbine rotor speed (N2), [1/min / %]:

Time unlimited:					
– maximum	46680 / 106	46650 / 106	45770 / 104	46650 / 106	44114 / 105
– minimum	41396 / 94	39608 / 90	40488 / 92	39608 / 90	39493 / 94
On transient modes:					
– maximum (20 sec)	47560 / 108	49290 / 112	48410 / 110	49290 / 112	47055 / 112
– minimum (20 sec)	37430 / 85	37408 / 85	39608 / 90	37408 / 85	38653 / 92
Value 100% N2, 1/min	44038	44009	44009	44009	42014

Torque, [N×m]:

Models	Arrius 2B2	Arrius 2K2	Arrius 2G1	Arrius 2F	Arrius 2R
Maximum shaft torque:					
Ratings:					
– 30-sec, OEI	905	—	—	—	—
– 2-min, OEI	905	—	—	—	—
– 2,5-min, OEI	—	830	830	—	—
– Continuous, OEI	740	760	760	—	—
– Take-off	740	760	760	650	600
– Max. continuous	660	680	680	600	550
– transient (< 20 sec)	—	961	961	752	660*

Note: * not more than 5 sec.

Other limitations:

- The operability of the Arrius 2 engine family (Arrius 2V2 / 2K2 / 2G1 / 2F / 2R models) in icing conditions is shown by tests without helicopter air intakes. The helicopter developer must demonstrate the operability of the specified engines with air intake devices in icing conditions. Helicopters EC 120 (Arrius 2F), A109LUH (Arrius 2K2), EC 135 (Arrius 2B2), Bell 505 (Arrius 2R) are not certified for flying in icing conditions "non-icing certified rotorcraft", and therefore the flights of these helicopters "Under known" icing conditions are prohibited.
- Protection of the Arrius 2 family engines (Arrius 2B2 / 2K2 / 2G1 / 2F / 2R models) against the ingress of foreign objects other than rain should be provided by the Helicopter Developer when these engines are installed on the helicopter. The engine developer installation requirements are listed in the relevant Installation Manual.
- Air Bleed Extraction for aircraft:
Maximum allowable air bleed for the needs of the helicopter:
 - 5.48% of the flow rate of the air entering the engine (Arrius 2K2, Arrius 2G1);
 - 4.5% of the flow rate of the air entering the engine (Arrius 2B2);
 - 70 g / s - during takeoff at sea level (Arrius 2F, Arrius 2R).
- The electronic engine control must be installed out of fire hazard zone. Installation conditions are defined in the appropriate Installation Manual.
- Operation of the Arrius 2 engine (model Arrius 2B2 / 2K2 / 2G1) is limited to applicability on a multi-engine helicopter only.
- Operation of the engine of the family Arrius 2 (model Arrius 2F / 2R) is limited to applicability on a single-engine helicopter only.
- For Arrius 2R, the oil tank is not part of the type design, it must be provided by the aircraft manufacturer with consideration of conditions for installing the oil tank described in the Installation Manual (Chapter 11 and 12).

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Original is signed by
Deputy Director of FATA

Mr. Alexey Novgorodov