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# **Type Acceptance Report**

**TAR 17/21B/20**

**SAFRAN ARRIUS 2**



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## Executive Summary

New Zealand Type Acceptance has been granted to the Safran Helicopter Engines Arrius 2 Series turboshaft engine based on validation of EASA Type Certificate number E.031. There are no special requirements for import.

Applicability is limited to the Models and/or serial numbers detailed in Appendix 1, which are now eligible for installation on a NZ-registered aircraft. Additional variants or serial numbers approved under the foreign type certificate can become type accepted after supply of the applicable documentation, in accordance with the provisions of NZCAR §21.43(b).

NOTE: The information in this report is correct as at the date of issue. The report is only updated when an application is received to revise the Type Acceptance Certificate. For details on the current type certificate holder and any specific technical data, refer to the latest State-of-Design Type Certificate Data Sheet.

## 1. Introduction

This report details the basis on which Type Acceptance Certificate No. 17/21B/20 was granted in the Standard Category in accordance with NZCAR Part 21 Subpart B.

Specifically the report aims to:

- (a) Specify the foreign type certificate and associated airworthiness design standard used for type acceptance of the model(s) in New Zealand; and
- (b) Identify any special conditions for import applicable to any model(s) covered by the Type Acceptance Certificate.

The report also notes the status of all models included under the State-of-Design type certificate which have been granted type acceptance in New Zealand. Models covered by the type acceptance certificate issued under Part 21B at Amendment 6 or later are listed in Section 2 of this report. Models which were accepted prior to that or under the Transitional Arrangements of Part 21 Appendix A are listed in Appendix 1 of this report.

## 2. Product Certification Details

### (a) State-of-Design Type and Production Certificates:

Manufacturer: Safran Helicopter Engines (since 1 August 2016)  
Turbomeca

Type Certificate: E.031  
Issued by: European Aviation Safety Agency

Production Approval: FR.21G.036

### (b) Models Covered by the Part 21B Type Acceptance Certificate:

(i) Models: Arrius 2F  
Arrius 2R

Environmental Standard: ICAO Annex 16 Volume II for emissions

### 3. Application Details and Background Information

The application for New Zealand type acceptance of the Arrius 2R was from the engine manufacturer, dated 31 March 2017. The Arrius 2 is a modular turboshaft engine in the 350-530 kW range, comprising a reduction gearbox module and a gas generator module.

Type Acceptance Certificate No. 17/21B/20 was granted on 19 July 2017 to the Arrius 2R based on validation of EASA Type Certificate E.031. There are no special requirements for import into New Zealand.

This report covers the Arrius “single’ versions approved for installation on single-engined helicopters. The first version was the Arrius 2F, which was developed for the EC120B. The Arrius 2F configuration consists 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. The reduction gear unit also includes the accessory gearbox driven by the gas generator and an oil tank. (Arrius 2F validation was previously granted in New Zealand as part of type acceptance of the Eurocopter EC120B helicopter.)

The new Arrius 2R version was produced for the Bell 505. It is essentially the same except that instead of the hydro-mechanical fuel control unit with manual backup mode of the 2F, the primary Engine Control System consists of a dual-channel digital Engine Control Unit (ECU), a dual-channel electric actuator and a fuel metering valve. There is also a Back-up Engine Control System consisting of an auxiliary metering valve, an auxiliary electric actuator and the same ECU.

#### 4. NZCAR §21.43 Data Requirements

The type data requirements of NZCAR Part 21B Para §21.43 have been satisfied by supply of the following documents, or were already held by the CAA:

(1) State-of-Design Type certificate:

EASA Type Certificate Number E.031

EASA Type Certificate Data Sheet no. E.031 at Issue 03 dated 24 October 2016

– Model Arrius 2F approved 22 January 1997

– Model Arrius 2R approved 15 December 2015

Supersedes:

Certificat de Type Moteur Numéro M22 for Arrius 2F dated 22 January 1997

Engine Data Sheet N° M22 Issue N° 3 – May 1998 with Courtesy Translation

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the Arrius 2F is JAR-E Change 9 dated 21 October 1994, except for Section 4 which is deleted by NPA-E-17 (Orange Paper E/96/1 dated 08 August 1996). For the Arrius 2R this was updated to CS-E Amendment 3, dated 23rd December 2010, except for three paragraphs (CS-E 515, CS-E 650 and CS-E 850) where the previous certification basis was still applied, as amended by Orange Paper E/96/1 for paragraph CS-E 515 for the Centrifugal Compressor Impeller, the Power Turbine Disc, and the Power Turbine Shaft.

This is an acceptable certification basis in accordance with NZCAR Part 21B paragraph §21.41 and Advisory Circular 21-1A, because JAR-E is equivalent to FAR Part 33, which is the basic standard for engines called up under Part 21 Appendix C. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23.

(ii) *Special Conditions:*

Nil

(iii) *Equivalent Level of Safety Findings:*

*Arrius 2F:*

CRI-T1 – Compressor and Turbine Rotor Integrity Tests – JAR-E 840 Equivalent Safety Finding – Issue 2 dated 20/11/96 – Compliance shown by similarity with Arrius 2B.

(iv) *Deviations:*

*Arrius 2F:*

CRI-T2 – Oil System – JAR-E 570 Exemption – The Arrius 2F has a ground pre-clogging indicator only – This was accepted on the basis the JAR-E requirements appear to be more stringent than the equivalent aircraft requirements with no apparent justification from service experience.

(v) *Airworthiness Limitations:*

See the Engine Maintenance Manual, Chapter 5, “Airworthiness Limitations”.



## (3) Aircraft Noise and Engine Emission Standards:

(i) *Environmental Standard:**Arrius 2F:*

CRI-A2 – Additional National Requirement – Environmental Requirement – at Issue 1 dated 21/11/96 – Ref: ICAO Annex 16, Volume II Issue 2 (Fuel venting only).

*Arrius 2R:*

CS-34 Amendment 1, dated 29th January 2013 in accordance with CS-E1010 Fuel Venting and the Environmental protection requirements of ICAO Annex 16, Volume II, Part II, Chapter 2 Amendment 7 effective 17th November 2011.

(ii) *Compliance Listing:*

Residual fuel after normal Engine shutdown is evacuated through the Engine drain system up to the Engine/Aircraft interface, which is defined in the Installation and Operating Manual.

## (4) Certification Compliance Listing:

Arrius 2F Compliance Check List Doc. N° X 319 L6 003 2 – Issue 11 May 1997  
Arrius 2F CRI-A1 – Type Certification Basis at issue 3 dated 21/11/96 JAR-E

Arrius 2R CCS (Certification Compliance Sheets) Collection – Doc. No. AA083239  
Arrius 2R – Compliance Check List – Document Number: AA083240 – Version B  
Note Technique AA084717 Version C – Arrius 2R Certification Basis

## (5) Flight Manual: Not Applicable

## (6) Operating Data for Engine:

(i) *Maintenance Manual:*

Arrius 2F Maintenance Manual – Document X 319 L6 301 2  
Arrius 2F Installation and Operating Manual – Doc. X 319 L6 001 2  
Arrius 2F Repair Manual – Document X 319 L6 500 2

Arrius 2R Maintenance Manual – Document X 319 R5 460 2  
Arrius 2R Installation and Operating Manual – Doc. X 319 R5 003 2  
Arrius 2R Repair Manual – Document X 319 R5 500 2

(ii) *Current service Information:*

Service Bulletin Index (2F/2R)  
Service Letter Index (2F/2R)  
Modification Index (2F/2R)  
Service Letters and Service Bulletins

(iii) *Illustrated Parts Catalogue:*

Arrius 2F Spare Parts Catalogue – Document X 319 L6 700 2  
Arrius 2F Maintenance Tools Catalogues – Document X 319 L6 800 2

Arrius 2R Spare Parts Catalogue – Document X 319 R5 710 2  
Arrius 2R Maintenance Tools Catalogues – Document X 319 R5 810 2

(7) Agreement from manufacturer to supply updates of data in (5), and (6):

CAA 2171 form from Turbomeca Head of Airworthiness Dept. dated 03.07.98  
Safran Helicopter Engines provides CAA access through the TOOLS Helicopter  
Engines Customer Portal website at <https://tools.safran-helicopter-engines.com>

(8) Other information:

Arrius 2F Performance Booklet – Document X 319 L6 002 9  
Turbomeca Arrius 2R Performance Brochure – Document X 319 R5 001 2

## Attachments

The following documents form attachments to this report:

Copy of EASA Type Certificate Data Sheet Number E.031

## Sign off

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David Gill  
Team Leader Airworthiness

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Checked – Craig Bamber  
Airworthiness Engineer

## Appendix 1

### List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
Arrius 2F	Eurocopter International Pacific Ltd	99/21B/5	16 October 1998
Arrius 2R	Safran Helicopter Engines	17/21B/20	19 July 2017