
Type Acceptance Report

TAR 15/21B/3

TURBOMÉCA ARRIEL 1

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Executive Summary

New Zealand Type Acceptance has been granted to the Turboméca Arriel 1 Series turboshaft engines based on validation of EASA Type Certificate number E.073. 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(c).

1. Introduction

This report details the basis on which Type Acceptance Certificate No.15/21B/3 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 product 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 foreign 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 below. Models which were accepted prior to that are listed in Appendix 1 of this report.

2. ICAO Type Certificate Details

Manufacturer: Turboméca

Type Certificate: E.073

Issued by: European Aviation Safety Agency

Model(s): Arriel 1A1, 1B, 1C, 1C1, 1C2, 1D, 1D1
1E2, 1K1, 1S, 1S1

Rating (kw)	Arriel 1A1	Arriel 1B	Arriel 1C	Arriel 1C1	Arriel 1C2
2 ½ minute OEI	498	n/a	522	538	569
Continuous OEI	480	n/a	512	526	550
Take-off	470	478	492	526	550
Maximum Continuous	432	440	437	437	471

Rating (kw)	Arriel 1D	Arriel 1D1	Arriel 1E2	Arriel 1K1	Arriel 1S	Arriel 1S1
2 ½ minute OEI	n/a	n/a	528	494	560	598
Continuous OEI	n/a	n/a	528	494	544	588
Take-off	510	531	528	494	523	541
Maximum Continuous	450	466	516	471	523	541

3. Type Acceptance Details

The application for type acceptance of the Arriel 1E2 was originally included as part of the validation of the Eurocopter Deutschland MBB-BK117 C-2 helicopter. It has now been separated out into this report. The Arriel 1 Series is a modular turboshaft engine with axial 1st stage compressor and centrifugal 2nd stage compressor driven by a two-stage turbine, a direct-flow annular combustion chamber, and a single-stage free turbine which drives a reduction gear assembly located at the aft end. The accessory gearbox, located at the forward end, is driven by the gas generator.

Type Acceptance was granted on 10 May 2007 to the Turboméca Arriel 1E2 engine approved under EASA Type Certificate number E.073. Specific applicability is limited to the coverage provided by the operating documentation supplied. There are no special requirements for import into New Zealand.

The Arriel 1B was first type accepted into New Zealand on the Aerospatiale AS350B helicopter in the early 1980s. Subsequently the Arriel 1D and 1D1 were accepted on the AS350B1 and AS350B2 versions. The Arriel 1A1 and the 1C were accepted as part of the validation of the Eurocopter SA365C and SA365N helicopters, respectively. (The Arriel 1B and 1D series are intended for single-engine helicopters, while the Arriel 1A, 1C, 1S, 1K and 1E series are designed for twin-engine helicopter installations.)

The report also added all the other active version of the Arriel 1 family, at the request of the applicant which was the manufacturer. The Arriel 1K1 is used on the Agusta A109K2 helicopter, while the Arriel 1S and 1S1 are fitted to the Sikorsky Models S-76A+ (by STC) and S76C helicopters, respectively. Type Acceptance was granted on 23 September 2014.

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) ICAO Type certificate:

EASA Type Certificate Number EASA.E.073

EASA Type Certificate Data Sheet number E.073 at Issue 03 dated 4 April 2014

- Model Arriel 1B approved 1 June 1977
- Model Arriel 1A1 approved 26 March 1979
- Model Arriel 1C approved 23 December 1980
- Model Arriel 1C1 approved 27 January 1982
- Model Arriel 1D approved 4 October 1985
- Model Arriel 1S approved 6 May 1987
- Model Arriel 1D1 approved 19 July 1988
- Model Arriel 1C2 approved 24 February 1989
- Model Arriel 1K1 approved 29 August 1990
- Model Arriel 1S1 approved 19 December 1990
- Model Arriel 1E2 approved 8 October 1993

Supersedes:

Certificat de Type Moteur Numero M5

Fiche de Caracteristiques Moteur No. M5 – Edition 12 – October 1985

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the Turboméca Arriel 1 Series is JAR-E Issue 1 and amendments applicable on June 5th 1974, including ratings as per FAR 33 for helicopter engines. This is an acceptable certification basis as JAR-E is equivalent to FAR Part 33, which is the basic airworthiness standard for aircraft engines called up under Part 21 Appendix C.

(ii) *Special Conditions:*

See letter from SGAC, former French Airworthiness Authority, reference 7525/DTA/SDT/MC dated 12/12/1974. This letter defines the certification basis of the Arriel engine, basely largely on JAR-E but with the engine ratings as defined in FAR 33 for helicopter engines (including details of the Type Definition [endurance] Tests), plus the special condition applicable to the single-engine version to take into account the fact that the free wheel, usually justified with the helicopter under FAR 27.923 (i), in this case is included as part of the engine.

(iii) *Equivalent Level of Safety Findings:*

Nil

(iv) *Airworthiness Limitations:*

See Arriel 1() MM Section 05-10-00 – Airworthiness Limitations – Approval

(3) Environmental Certification:

Not Applicable

(4) Certification Compliance Listing:

Liste des Documents Technique – Arriel 1A1/1B_CCL

Liste des Documents Technique – Arriel 1C/1C1_292 02 939_CCL

Notes Techniques Turbomeca – Arriel C2_6792_CCL

Notes Techniques Turbomeca – Arriel 1D_4939_CCL

Notes Techniques Turbomeca – Arriel 1D1_X292 E5 901 1_CCL

Notes Techniques – Arriel 1E_X292 G2 900 1_CCL

Courtesy Translation of Chapter 4 “Demonstration of Compliance” of AF 07-166, the certification booklet of the Arriel 1E2.

Liste des Documents Technique – Arriel 1K_292 D8 900 1_CCL

Notes Techniques Turbomeca – Arriel 1S_X 292 F9 901 1_CCL

Notes Techniques – Arriel 1S1_X 292 F9 904 1_CCL

(5) Flight Manual: N/A

(6) Operating Data for Engine:

(i) *Maintenance Manual:*

Arriel 1X Maintenance Manual – P/N X 292 XX 452 1/2

Note: X 292 = Arriel; XX = Arriel version; 452 = manual type; 2 = language

B3 = Arriel 1A1; 65 = Arriel 1B; B0 = Arriel 1C; C3 = Arriel 1C1;

G1 = Arriel 1C2; E5 = Arriel 1D; G2 = Arriel 1D1; M3 = Arriel 1E2

H3 = Arriel 1K1; F9 = Arriel 1S; H4 = Arriel 1S1

Arriel 1 Repair Manual – P/N X 292 87 500 2

(ii) *Current service Information:*

Arriel 1 Series Service Bulletins and Service Letters

(iii) *Illustrated Parts Catalogue:*

Arriel 1X – Maintenance Spare Parts Catalogue – No. X 292 XX 702 2

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

CAA2171 from Turbomeca Deputy Head of Airworthiness Dept. dated 26-03-2006

Access to publications is provided at the www.turbomeca-support.com website

(8) Other information:

Turboméca Arriel 1X Installation Drawing and Manual – X 292 XX 001 2

Turboméca Arriel 1X Performance Booklet – X 292 XX 900 9

Attachments

The following documents form attachments to this report:

Copy of EASA Type Certificate Data Sheet Number E.073

Sign off

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David Gill
Team Leader Airworthiness

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Checked – Owen Olls
Airworthiness Specialist

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
Arriel 1B, 1D, 1D1	AC 21-1 Appendix 2/NZCAR Part 21 Appendix A(c)		
Arriel 1A1	D. L. McIlroy	98/21B/6	11 June 1998
Arriel 1C	Rick Lucas Helicopters Ltd	5/21B/13	11 November 2004
Arriel 1E2	Eurocopter Deutschland GmbH	7/21B/10	10 May 2007
Arriel 1C1, 1C2	Turboméca	15/21B/3	23 September 2014
Arriel 1K1, 1S, 1S1	Turboméca	15/21B/3	23 September 2014