Type Acceptance Report

TAR 15/21B/22 – Revision 1

SCHEMPP-HIRTH ARCUS Series

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Executive Summary

New Zealand Type Acceptance has been granted to the Schempp-Hirth Arcus Series based on validation of EASA Type Certificate number EASA.A.532. There are no special requirements for import.

Applicability is currently limited to the Models and/or serial numbers detailed in Section 2, which are now eligible for the issue of an Airworthiness Certificate in the Standard Category in accordance with NZCAR §21.191, subject to any outstanding New Zealand operational requirements being met. (See Section 5 of this report for a review of compliance of the basic type design with the operating Rules.) 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).

NOTE: The information in this report was correct as at the date of issue. The report is generally 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 revision of the State-of-Design Type Certificate Data Sheet referenced herein.

1. Introduction

This report details the basis on which Type Acceptance Certificate No. 15/21B/22 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; and

(c) Identify any additional requirements which must be complied with prior to the issue of a NZ Airworthiness Certificate or for any subsequent operations.

The report notes the status of all models included under the State-of-Design type certificate which have been granted type acceptance in New Zealand, which are listed in Section 2. The history of the Schempp-Hirth Arcus model type acceptance in New Zealand under type certificate EASA.A.532 is listed in Appendix 1.

2. Aircraft Certification Details

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

Manufacturer: Schempp-Hirth Flugzeugbau GmbH

Type Certificate: EASA.A.532
Issued by: European Union Aviation Safety Agency

Production Approval: DE.21G.002

(b) Other State-of-Manufacture Type and Production Certificates:

(i) Model: Arcus T

MCTOW: 800 kg [1763 lb.] – with Water Ballast
850 kg [1874 lb.] – with Mod. Bulletin A532-4

Max. No. of Seats: 2

Noise Standard: ICAO Annex 16, Volume 1, Chapter 10

Engine: Solo 2350 D
Type Certificate: LBA 4603
Issued by: European Union Aviation Safety Agency

Propeller: OE-FL 5.110/83 av
Type Certificate: LBA OE-FL ./83
Issued by: European Union Aviation Safety Agency

(ii) Model: Arcus M

MCTOW: 800 kg [1763 lb.] – with Water Ballast
850 kg [1874 lb.] – with Mod. Bulletin A532-4

Max. No. of Seats: 2

Noise Standard: ICAO Annex 16, Volume 1, Chapter 10

Engine: Solo 2625-02 (modified per SB 4600-3)
Type Certificate: EASA.E.218
Issued by: European Union Aviation Safety Agency

Propeller: Technoflug KS-1G-160-R-120
Type Certificate: LBA 32.110/18
Issued by: European Union Aviation Safety Agency

Binder BM-G-160-R-120-1
Type Certificate: EASA.P.500
Issue by: European Union Aviation Safety Agency

(iii)	Model:	Arcus
	MCTOW:	750 kg [1653 lb.] – with Water Ballast 850 kg [1874 lb.] – with Mod. Bulletin A532-4
	Max. No. of Seats:	2
	Noise Standard:	Not applicable

3. Application Details and Background Information

The application for New Zealand type acceptance of the Schempp-Hirth Arcus Series was from the local agent, Mr Ross Gaddes, dated 7 May 2015. The application was supported by a package of data provided directly from the aircraft manufacturer. The first-of-type example was Arcus M serial number 116, registered ZK-GBF. The Arcus is a flapped two-seat FAI 20-metre racing class glider of all composite construction, with optional water ballast.

Type Acceptance Certificate Number 15/21B/22 was granted on 29 June 2015 to the Schempp-Hirth Arcus Series based on validation of EASA Type Certificate number A.532. There are no special requirements for import into New Zealand.

This report was raised to Revision 1 to include the serial numbers marketed as the Arcus "20" Series which incorporate during production Modification Bulletin A532-4, and use new flight and maintenance manuals. The first-of-type example was serial number 262 registered ZK-GRF. Type Acceptance was granted on 16 March 2023.

Model History:
The Arcus was developed using an all-new wing design with full span flaperons mated to the "L" cockpit design, as used on the Duo Discus xL. The Arcus is available as a pure glider, a sustainer powered version Arcus T using the retractable Oehler-Turbo (22 kW Solo 2350D) engine, and as a self-launching powered version Arcus M using the Binder (50 kW Solo 2625-02) powerplant system.

The major changes to the Arcus "20" include a new smaller horizontal tailplane with revised planform and aerofoil section; a new cockpit design using visible carbon-construction; a bug wiper "garage" is provided at the wing/fuselage junction which doesn't protrude from the fuselage when retracted; revised winglets are installed; electrical operation of the landing gear is introduced; and the MAUW is increased.

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) Type certificate:

EASA Type Certificate Data Sheet No. EASA.A.532 Issue 06 dated 11 Nov 2020
- Arcus T approved 17 May 2011
- Arcus M approved 20 June 2013
- Arcus approved 31 July 2014

(2) Airworthiness design requirements:

(i) Airworthiness Design Standards:

The certification basis of the Arcus is the Certification Specifications for Sailplanes and Powered Sailplanes (CS-22), effective on November 14, 2003. Additional requirements were the LBA Standards for the Structural Substantiation of Sailplane and Powered Sailplane Components consisting of Glass or Carbon Fiber Reinforced Plastics, issued July 1991; and the Provisional Guideline: Electrostatic Requirements for Powered Sailplanes and Gliders, (T405, issue 24.11.2004); and Guideline for the Analysis of the Electrical System for Powered Sailplanes, I334-MS 92, issued 15.September 1992. One equivalent level of safety was granted, which was reviewed and accepted by the CAA.

This is an acceptable certification basis in accordance with CAR Part 21B paragraph §21.41 and Appendix C(a)(2), as CS 22 is an equivalent standard for Sailplanes and Powered Sailplanes under Advisory Circular 21-1 Appendix 3. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23. The Arcus Series is approved for Day VFR flight, and for cloud flying when additional specified equipment is fitted.

(ii) Special Conditions:

Nil

(iii) Equivalent Level of Safety Findings:

Arcus M and T:

CS 22.207(a) – With the engine extended and not operating the natural stall warning is disguised by buffet. This is acceptable because flying in this configuration is only short term, and not used during the approach; the minimum speed for powerplant retraction or extension is well above the stall speed, and in addition the action is easy for the pilot to achieve without distracting from piloting duties; and stalling behaviour is very docile, with little altitude loss.

Arcus – All Models:

CS 22.207(c) – With the C.G. in the rearward position the stall warning in some cases begins above 1.1 V_{S1}. However this is acceptable because IAS values drop quickly and still give the pilot a good indication that the stall is approaching.

(iv) Airworthiness Limitations:

See Maintenance Manual §3.3 Special Inspections of the Airframe

(3) Aircraft Noise and Engine Emission Standards:

(i) Environmental Standard:

The Flight Manuals state the aircraft comply with the revised Aircraft Noise Protection Requirements of Neufassung der Lärmvorschriften für Luftfahrzeuge (LVL) effective on January 1st, 1991, with changes, effective on April 6th, 1993 [Arcus T] and effective on August 1st, 2004 [Arcus M].

(ii) Compliance Listing:

TCDS for Noise EASA.A.532 at Issue 05 dated 21 October 2021.

Model:	Engine:	Propeller:	MAUW:	Noise Standard:	Take-off Noise Level:
Arcus-M	2650-02 i	Binder	800 kg	ICAO Annex 16	75.3 dB(A)
Arcus-M	2650-02 i	Technoflug	800 kg	ICAO Annex 16	65.8 dB(A)
Arcus-M	2650-02 i	Binder	850 kg	ICAO Annex 16	76.2 dB(A)
Arcus-M	2650-02 i	Technoflug	850 kg	ICAO Annex 16	66.1 dB(A)

At 300 metre (984 ft) AGL, the measured fly-over noise level of the Arcus T is 57.3 dB(A). (See Flight Manual Section 5.3.3)

(4) Certification Compliance Listing:

Nachweisliste (Mz) / Compliance Checklist – Geräte-Nr.: 532 – Schempp-Hirth Type: Arcus T dated 17.11.2010; and Flight Test Report – Arcus T

Nachweisliste (Mz) / Compliance Checklist – Geräte-Nr.: 532 – Schempp-Hirth Type: Arcus M dated 25.01.2012; and Flight Test Report – Arcus M

Nachweisliste (Mz) / Compliance Checklist – Geräte-Nr.: 532 – Schempp-Hirth Type: Arcus dated 24.02.2014; and Einzelnachweise (FTR) – Arcus

(5) Flight manual: EASA-Approved Flight Manual for Powered Sailplane Arcus M CAA Accepted as AIR 3313

EASA-Approved Flight Manual for Powered Sailplane Arcus T CAA Accepted as AIR 3321

EASA-Approved Flight Manual for Sailplane Arcus CAA Accepted as AIR 3322

EASA-Approved Flight Manual for Powered Sailplane Arcus M (according to Modification Bulletin A532-4) – CAA Accepted as AIR 3508

EASA-Approved Flight Manual for Powered Sailplane Arcus T (according to Modification Bulletin A532-4) – CAA Accepted as AIR 3509

EASA-Approved Flight Manual for Sailplane Arcus (according to Modification Bulletin A532-4) – CAA Accepted as AIR 3510

(6) Operating Data for Aircraft:

(i) Maintenance Manual:
Maintenance Manual for powered sailplane model Arcus M

Maintenance Manual for powered sailplane model Arcus M (according to Modification Bulletin A532-4)

Maintenance Manual for powered sailplane model Arcus T

Maintenance Manual for powered sailplane model Arcus T (according to Modification Bulletin A532-4)

Maintenance Manual for sailplane model Arcus

Maintenance Manual for sailplane model Arcus (according to Modification Bulletin A532-4)

(All include standard Schempp-Hirth Repair Instructions)

(ii) Current service Information:
Technical Notes (Available on the manufacturer website)

(iii) Illustrated Parts Catalogue:
N/A – Not produced

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

Form CAA 2171 from Schempp-Hirth Chief Technical Officer dated 08.05.2015

(8) Additional Information:

Modification Bulletin AS532-4

5. New Zealand Operational Rule Compliance

Compliance with the following additional NZ requirements has been reviewed and were found to be covered by either the original certification requirements or the basic build standard of the aircraft, except as noted:

Civil Aviation Rules Part 26

Subpart B - Additional Airworthiness Requirements

Appendix B - All Aircraft

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
B.1	Marking of Doors and Emergency Exits	***To be determined on an individual aircraft basis***
B.2	Crew Protection Requirements – CAM8 Appdx. B#.35	N/A – Agricultural Aircraft only

Civil Aviation Rules Part 91

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
91.505	Shoulder harness: aerobatic; >10 pax; flight training	CS 22.1307 – Four-piece safety harness (symmetrical) is required minimum equipment in both cockpits – *See FM §2.12*
91.507	Pax Info Signs – Smoking, safety belts fastened	N/A – Single-seat glider
91.509	Minimum Instruments and Equipment	Not Applicable to a powered glider
91.511	Night VFR Instruments and Equipment	N/A – Certificated for Day VFR flight only
91.517	IFR Instruments and Equipment	N/A – Certificated for Day VFR flight only
91.519	IFR Communication and Navigation Equipment	N/A – Certificated for Day VFR flight only
91.523	Emergency Equipment	N/A – Superseded by §104.101(5)
91.529	ELT – TSO C91a after 1/4/97 (or replacement)	***To be determined on an individual aircraft basis***
91.531	Oxygen Indicators – Volume/Pressure/Delivery	Drawings for the installation of oxygen systems may be obtained from the manufacturer – *See Flight Manual §7.13*
91.533	Oxygen for Non-Pressurised Aircraft	***Operational requirement – compliance as applicable***
91.541	SSR Transponder and Altitude Reporting Equipment	***Operational requirement – compliance as applicable***
91.543	Altitude Alerting Device – Turbojet or Turbofan	N/A – Not turbojet or turbofan powered
91.545	Assigned Altitude Indicator	N/A – Certificated for Day VFR flight only
A.15	ELT Installation Requirements	Installation of an Emergency Locator Transmitter is possible in three specified locations. It must comply with the instructions provided by Schempp-Hirth – *See Flight Manual §7.13*

Civil Aviation Rules Part 104

Subpart C - Equipment and Maintenance Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
104.101	(1) Airspeed Indicator	Required as Minimum Equipment – See TCDS Section B.III.3
	(2) Altimeter (Adjustable for barometric pressure)	Required as Minimum Equipment – See TCDS Section B.III.3
	(3) Magnetic Compass	Required as Minimum Equipment – See TCDS Section B.III.3
	(4) Safety Harness for each seat	Required as Minimum Equipment – See TCDS Section B.III.3
	(5) A First Aid Kit	***Operational requirement – compliance as applicable***
	(6) For powered gliders –	
	(i) Fuel gauge for each main fuel tank	Required as Minimum Equipment – See TCDS Section B.III.3
	(ii) Oil Pressure Gauge or warning device	N/A – Two-stroke engine
	(iii) A tachometer or engine governor light	Engine Control Unit MCU II indicates RPM and Engine Time – Required as Minimum Equipment – See TCDS Section B.III.3
	(7) For IMC –	
	(i) A variometer	N/A – Arcus is approved for cloud flying, when appropriately equipped (See FM Section §2.2.2(b))
	(ii) Turn & Slip/Artificial Horizon	
	(iii) Radio transceiver	

NOTES: 1. A Design Rule reference in the Means of Compliance column indicates the Design Rule was directly equivalent to the CAR requirement, and compliance is achieved for the basic aircraft type design by certification against the original Design Rule.

2. The CAR Compliance Tables above were correct at the time of issue of the Type Acceptance Report. The Rules may have changed since that date and should be checked individually.

Attachments

The following documents form attachments to this report:

Copy of Type Certificate Data Sheet EASA.A.532

Sign off

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David Gill
Team Leader Aircraft Inspection

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Checked – John Marshall
Airworthiness Inspector

Appendix 1

List of Type Accepted Variants:

Model:	*Applicant:*	*CAA Work Request:*	*Date Granted:*
Arcus M, Arcus T, Arcus	R M Gaddes	15/21B/22	29 June 2015
Arcus Series (MB A532-4)	Sailplane Services 2005 Ltd	23/21B/13	16 March 2023

Appendix 2

Three-view drawing Schempp-Hirth Arcus: