Type Acceptance Report

TAR 6/21B/17 – Revision 2

Schempp-Hirth Discus-2T/2cT/2c-FES

TABLE OF CONTENTS

EXECUTIVE SUMMARY **1**

1. INTRODUCTION **1**

2. AIRCRAFT CERTIFICATION DETAILS **2**

3. APPLICATION DETAILS AND BACKGROUND INFORMATION **3**

4. NZCAR §21.43 DATA REQUIREMENTS **4**

5. NEW ZEALAND OPERATIONAL RULE COMPLIANCE **7**

ATTACHMENTS **8**

APPENDIX 1 – NZ TYPE ACCEPTANCE HISTORY **8**

APPENDIX 2 – THREE-VIEW DRAWING **9**

Executive Summary

New Zealand Type Acceptance has been granted to the powered versions of the Schempp-Hirth Discus-2 based on validation of Type Certificate number EASA.A.050. 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. 6/21B/17 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 type acceptance of powered versions of the Schempp-Hirth Discus-2 under type certificate EASA.A.050 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.050
Issued by:	European Union Aviation Safety Agency
Production Approval:	DE.21G.002

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

(i) **Models:** Discus-2T, Discus-2cT

MCTOW:	565 kg [1245 lb.] – 18m span with water ballast 525 kg [1157 lb.] – 15m span with water ballast
Max. No. of Seats:	1
Noise Standard:	Luftfahrt-Bundesamt LSL/LVL
Engine:	Solo 2350 Type Certificate: E-219 Issued by: European Union Aviation Safety Agency
Propeller:	OE-FL 5.83/83 a5, V92 Type Certificate: Data Sheet Number OE-FL./83 Issued by: Luftfahrt-Bundesamt

(ii) **Model:** Discus-2c FES

MCTOW:	565 kg [1245 lb.] – 18m span with water ballast 525 kg [1157 lb.] – 15m span with water ballast
Max. No. of Seats:	1
Noise Standard:	ICAO Annex 16, Volume 1
Engine:	FES-DIS-M100 Type Certificate: Not Applicable (engine accepted as part of the aircraft)
Propeller:	FES-DIS-P1-102 Type Certificate: Not Applicable (propeller accepted as part of the aircraft)

3. Application Details and Background Information

The application for New Zealand type acceptance of the Discus-2T was taken to be from the local representative, Drake Aviation Limited dated 6 December 2005, although an application was also received from the manufacturer. The first-of-type example was serial number 23, registered ZK-GOE. The Discus-2T is a single-seat all composite midwing 15 metre-span powered sailplane with winglets and a T-tail.

Type Acceptance Certificate No. 6/21B/17 was granted on 22 December 2005 to the Schempp-Hirth Model Discus-2T based on validation of Type Certificate EASA.A.050. There are no special requirements for import into New Zealand.

This Report was raised to Revision 1 to include the Discus-2cT variant. The applicant was the agent, Mr R M Gaddes, and type acceptance was granted on 12 December 2006. The first-of-type example was serial number 36, registered ZK-GXM.

Revision 2 was issued to include the Discus-2c FES variant. The application was from Sailplane Services 2005 Limited dated 27 July 2022, and the first-of-type example was serial number 65 registered ZK-GFE. Type acceptance was granted on 16 May 2023.

The Discus-2T is the non-self-launching powered variant of the Discus-2b (See TAR 0/21B/15) and is identical except for the "Turbo" sustainer engine system. This powerplant installation is used on a range of Schempp-Hirth powered gliders. The Discus-2cT is the powered variant of the Discus-2c. All versions of the Discus-2 Open Class glider are available with either a 15m or 18m span wing and winglets.

The Discus-2c FES is the powered version of the Discus-2 with the nose-mounted 30hp electric-powerplant package (FES – Front Electric Sustainer) produced by LZ-Design in Slovenia. This uses a brushless DC synchronous permanent magnet electric motor, with an electronic controller mounted on top of the main wheel box. A one-meter-diameter carbon fibre propeller extends centrifugally when the motor is operating, or folds flat against the nose when not in use. The engine and propeller were approved as part of the aircraft, because they do not have type certificates. Under EASA Part 21.A.23(b)(2) this is permitted when the engine and propeller are shown to be in compliance with the certification specifications necessary to ensure safe flight of the aircraft. Under EASA policy the use of non-type certificated products is limited to ELA1, and the aircraft were originally only eligible for a Restricted Category airworthiness certificate. EASA has since changed the latter policy to allow certification in the Standard Category from MSN 67 on. To effect this change for earlier serial numbers the manufacturer issued Technical Note 863-24, which was approved under EASA Major Change Approval 10081590 and involves embodiment of a Flight Manual revision.

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 EASA.A.050 issued 16 September 2005

Type Certificate Data Sheet no. EASA.A.050 at Issue 05 dated 30 March 2023
- Model Discus-2T LBA-approved 18 March 2002
- Model Discus-2cT EASA-approved 16 September 2005
- Model Discus-2c FES EASA-approved 31 July 2017

(2) Airworthiness design requirements:

(i) Airworthiness Design Standards:

The certification basis of the Discus-2T/2cT/2c FES is the Joint Airworthiness Requirements for Sailplanes and Powered Sailplanes (JAR 22) effective on June 27th, 1989 (Change 4 of the English Original Issue), including Amendment 22/90/1. Additional requirements which the manufacturer elected to comply with were :

- NPA 22A, B, G-18 concerning powered sailplanes not capable of self-launching, dated April 1990;
- Standards for structural substantiation of sailplanes and powered sailplane components consisting of glass or carbon fibre reinforced plastic, issued July 1991;
- Additional requirements for the installation of a water ballast system into the fin (for compensating the nose-heavy moment of water ballast in wing tanks). LBA-Reference I4 – I 413/89 dated October 25, 1989;
- Draft NPA 22 D-46 dated April 7, 1994, relating to JAR 22.785(e)(f) “Seat and Restrain System”;
- Draft NPA 22 D-64 (various dates) relating to JAR 22.788 “Head Rests”.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41, as JAR-22 is the basic standard for powered sailplanes called up under Advisory Circular 21-2. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23. The Discus-2T series is approved for Day-VFR operations. (Cloud flying and aerobatic flying according to the specifications in the Flight Manual, with restricted maximum mass and without water ballast for the Discus-2cT.)

(ii) Special Conditions:

Discus-2c FES:

SC.22-2014-01 Installation of electric propulsion units in powered sailplanes – CRI E-101 specified a detailed set of additional safety requirements for electric propulsion systems using rechargeable (Li-Po) batteries as an energy storage device. These have specific failure and operational characteristics that could affect the safety of those installations and cause hazards to safety. These requirements were added under CS22 individual paragraphs.

SC E-01 Electrical Engine for powered sailplanes – In accordance with article 11 of EC 2018/1139 no separate type certificate is required for engines and propellers that have been certified as part of an aircraft. CRI H-101 defined the certification specifications as part of a CS-22 sailplane. These were presented as additions to CS22 individual paragraph headings.

(iii) Equivalent Level of Safety Findings:

Discus-2T and Discus-2cT:

JAR 22.1093(a) – No pre-heater is fitted because the induction pipe is close to the warm cylinders and service experience with 170 aircraft has shown intake icing is not a problem.

Discus-2cT and Discus 2c FES:

JAR 22.207(a) and (c) – As per the exemption for the Discus-2T model, an approach is not permitted with the engine extended but not running. In the aft centre of gravity condition the stall warning occurs at a speed higher than 1.1 V_{si}, but this was accepted because IAS values drop quickly and there is a clear stall warning buffet.

Discus-2c FES:

JAR 22.1047 Cooling test procedure for engine-powered sailplanes – The maximum corrected temperature of the batteries exceeded 55° C, which is the maximum normal operating temperature by only 1° C. This can be accepted through an equivalent level of safety because the FCU instrument gives clear warnings at elevated temperatures.

JAR 22.1191 Firewalls – The engine is separated from the sailplane by a bulkhead. The bulkhead and engine cooling system are designed so that no dangerous quantity of liquids, gases or flames from elevated engine temperatures can pass from the engine compartment into other parts of the sailplane. The fuselage skin and bulkhead in the compartment have been tested up to 80 °C to show resistance to higher temperatures and that no fire is likely.

JAR 22.1549(d) Power-plant Instruments – Limit values for the engine are displayed in the FCU instrument with a colour coding. The normal range is indicated by numbers; the caution area is shown by a yellow message on the display; and two ways of displaying the red line (flashing red LED and red warning message), are considered to provide equivalent safety.

(iv) Exemptions:

Discus-2T:

JAR 22.207(a) – Adequate stall warning is not given when the engine is extended but not running, because of the superimposition of vibration due to turbulence produced by the propeller. Therefore this configuration is not permitted for the approach, except in an emergency. (See Flight Manual §4.5.4.b])

(v) Airworthiness Limitations:

See the Flight Manual Section 2.14 for airframe lifetime limitations

(3) Aircraft Noise and Engine Emission Standards:

(i) Environmental Standard:

Under EASA the powered Discus-2T/2cT/2c-FES conforms with the provisions of Article 6.1 of Regulation 216/2008 without the need to comply with the Standards of ICAO Annex 16, Volume I, Chapter 10, as it is a self-sustaining powered sailplane.

(ii) Compliance Listing:

TCDS for Noise TCDSN.A.050 at Issue 4 dated 19 July 2019

Discus-2T and Discus-2cT – At 300 m (984 ft) AGL the measured fly-over noise level is 57.7 dB(A) – See Flight Manual §5.3.3 Noise Data

(4) Certification Compliance Listing:

Nachweisliste (MZ) Compliance Checklist Discus-2T dated 10.01.2002

Nachweisliste (MZ) Compliance Checklist Discus-2cT dated 22.06.2005

Nachweisliste (Mz) / Compliance Checklist – Restricted Variant Discus-2cFES
CRI A-1 – EASA Type Certification Basis – Discus-2cFES
CRI A-2 – Acceptance of Engine and/or Propeller as Part of Aircraft Type Design

(5) Flight Manual: LBA-Approved Flight Manual for Powered Sailplane Discus-2T
CAA Accepted as AIR 2936

LBA-Approved Flight Manual for Powered Sailplane Discus-2cT
CAA Accepted as AIR 2985

EASA-Approved Flight Manual for Powered Sailplane Discus-2c FES – CAA Accepted as AIR 3499

(6) Operating Data for Aircraft:

(i) Maintenance Manual:
Maintenance Manual for Powered Sailplane Discus-2T
Maintenance Manual for Powered Sailplane Discus-2cT
(Note: Both include Schempp-Hirth Repair Instructions for Sailplanes and Powered Sailplanes Constructed from Fiber Reinforced Plastic [FRP])

Maintenance Manual for the Powered Sailplane Discus-2c FES
(Includes Repair Instructions for Discus-2c FES)
(Includes FES Motor Manual and FES Maintenance Manual)

FES Battery Pack GEN2 manual – with integrated BMS

FES Battery Management System (BMS) Control Manual

FES Propeller Manual – Type: FES-DIS-P1-102

FES FCU Instrument Manual

(ii) Current service Information:
Summary of Technical Notes and ADs – Discus bT/EASA.A.050

Summary of Schempp-Hirth Modification Bulletins – Discus bT/EASA.A.050

Technical Note No. 862-24: Transition of the type certification of the Discus-2c FES from the restricted airworthiness category into the non-restricted airworthiness category.

(iii) Illustrated Parts Catalogue:
Not produced

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

CAA 2171 Schempp-Hirth Chief of Technical Office dated 30.11.2005 (Discus-2T)
CAA 2171 Schempp-Hirth Head of Technical Office dated 4.12.2006 (Discus-2cT)
CAA 2171 signed by Schempp-Hirth Head of Technical Office dated 05.08.2022

5. New Zealand Operational Rule Compliance

Compliance with the retrospective airworthiness requirements of NZCAR Part 26 has been assessed as they are a prerequisite for the grant of an airworthiness certificate.

CAR 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 – CAM 8 Appendix. B #.35	Not Applicable – Agricultural Aircraft only

Compliance with the following additional NZ operating 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:

CAR Part 91 – Subpart F – Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
91.505	Shoulder Harness if Aerobatic; >10 pax; Flight Training	Four-piece seat belt harness fitted – See Flight Manual §7.5
91.507	Pax Information Signs – Smoking, safety belts fastened	Not Applicable – Single-seat glider
91.509	Minimum Instruments and Equipment	Not Applicable – Powered aircraft only
91.511	Night VFR Instruments and Equipment	Not Applicable – Certificated for Day VFR flight only
91.513	VFR Communication Equipment	***Operational requirement – compliance as applicable***
91.517	IFR Instruments and Equipment	Not Applicable – Certificated for Day VFR flight only
91.519	IFR Communication and Navigation Equipment	Not Applicable – Certificated for Day VFR flight only
91.523	Emergency Equipment	N/A – Two-seat glider [Superseded by §104.101(5)]
91.529	ELT – TSO C91a after 1/4/97 (or replacement)	***Operational requirement – compliance as applicable***
91.531	Oxygen Indicators – Volume/Pressure/Delivery	***Operational requirement – compliance as applicable***
91.533	Oxygen for Non-Pressurised Aircraft	***Operational requirement – compliance as applicable***
	Attachment points for oxygen bottle mounting brackets are provided behind the canopy. Drawings for installation of an O_2 system can be obtained from the factory – See FM §7.13	
91.541	SSR Transponder and Altitude Reporting Equipment	***Operational requirement – compliance as applicable***
91.543	Altitude Alerting Device – Turbojet or Turbofan	Not Applicable – Certificated for Day VFR flight only
91.545	Assigned Altitude Indicator	Not Applicable – Certificated for Day VFR flight only
A.15	ELT Installation Requirements	***To be determined on an individual aircraft basis***

CAR 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 #III.3
	(2) Altimeter (Adjustable barometric pressure)	Required as Minimum Equipment – See TCDS Section #III.3
	(3) Magnetic Compass	Required as Minimum Equipment – See TCDS Section #III.3
	(4) Safety Harness for each seat	Required as Minimum Equipment – See TCDS Section #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 #III.3
	(ii) Oil Pressure Gauge or warning device	Not Applicable – Two-stroke (pre-mix system) or electric engine
	(iii) A tachometer or engine governor light	Required as Minimum Equipment – See TCDS Section #III.3
	(7) For IMC flight –	
	(i) A variometer	⎫
	(ii) Turn & Slip/Artificial Horizon	⎬ This equipment must be fitted if the sailplane is used for cloud
	(iii) Radio transceiver	⎭ flying [See Flight Manual Section 2.12.2]

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 EASA Type Certificate Data Sheet Number EASA.A.050

Sign off

……..
David Gill
Team Leader Aircraft Inspection

……..
Checked – John Marshall
Airworthiness Inspector

Appendix 1

List of Type Accepted Variants:

Model:	*Applicant:*	*CAA Work Request:*	*Date Granted:*
Discus-2T	Drake Aviation Limited	6/21B/17	22 December 2005
Discus-2cT	R M Gaddes	7/21B/15	12 December 2006
Discus-2c FES	Sailplane Services 2005 Limited	23/21B/1	16 May 2023

Appendix 2

3-view drawings Schempp-Hirth Model Discus-2cT and Discus-2c FES: