
Type Acceptance Report

TAR 3/21B/8 – Revision 1

DG-800 Series

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Executive Summary

New Zealand Type Acceptance has been granted to the DG Flugzeugbau DG-800 Series powered glider based on validation of EASA Type Certificate number A.067. There are no special requirements for import.

Applicability is currently limited to the Models and/or serial numbers detailed in Appendix 1, which are now eligible for the issue of an Airworthiness Certificate in the Standard Category in accordance with NZCAR §21.177, 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(b).

1. Introduction

This report details the basis on which Type Acceptance Certificate No.3/21B/8 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.

2. Foreign Type Certificate Details

Manufacturer: DG Flugzeugbau GmbH

Type Certificate: EASA.A.067
Issued by: European Aviation Safety Agency

Model(s): DG-800 B

MCTOW: 525 kg (1157 lb)

Max. No. of Seats: 1

Noise Standard: Noise requirements for aircraft (LSL) issued Jan 1st, 1991
Measured Noise Level: 51.8 dB(A)

Engine: Solo 2 625 01

Type Certificate: LBA-Data Sheet No. 4600

Propeller: Technoflug KS 1 G-152-R-122-()-B
Type Certificate: LBA-Data Sheet No. 32.110/18
Model(s): DG-808 C
MCTOW: 600 kg (1322 lb) – DG-808C Competition (18m)
540 kg (1190 lb) – DG-808C Competition (15m)
525 kg (1157 lb) – DG-808C Classic (15m and 18m)
Max. No. of Seats: 1
Noise Standard: ICAO Appendix 16, Volume I, Part II, Chapter 10
Measured Noise Level: 61.0 dB(A) with 15m wingspan 540 kg
Measured Noise Level: 61.3 dB(A) with 18m wingspan 600 kg

Engine and propeller are the same as the DG-800B.

3. Type Acceptance Certificate

The application for New Zealand type acceptance was from the manufacturer dated August 27, 2002. The first-of-type example was serial number 8-279B187 registered ZK-GPM.

Type Acceptance Certificate No.3/21B/8 was granted on 8 January 2003 to the DG-800B based on validation of LBA Type Certificate 873. Specific applicability is limited to the coverage provided by the operating documentation supplied, in this case aircraft powered by the Solo engine. (The TCDS lists the Mid-West AE 50T as an option, with a different Flight Manual. However the manufacturer's website states the Solo has been selected as the standard engine.) There are no special requirements for import into New Zealand.

This report was raised to Revision 1 to add the Model DG-808C, after application from the manufacturer dated 11 May 2006. The change in type certificate responsibility to EASA was also recorded. Type acceptance was granted on 27 October 2006. The first-of-type example was serial number 8-359B258X23 registered ZK-GWD.

The DG-800A is a single-seat high performance self-launching motorglider with retractable powerplant, which was first certificated in 1994. The Model DG-800B was approved in 1997, and replaced the original external Rotax 505 engine with a buried water-cooled Solo engine. All versions are standard with an 18m span, while 15m wingtips with winglets are optional. Construction is carbon-fibre with a hybrid carbon and aramid fibre for the fuselage. The latter incorporates DG's "safety cockpit" concept of having an inner and outer shell. Starting with serial number 219 delivered in 2001, DG introduced an improved version with an enlarged vertical fin surface, along with a number of other detail refinements. This is marketed as the Model DG-808B, although officially the designation is unchanged and the same manuals apply. The Model DG-808C is a further development with a stronger undercarriage, new electronic engine control system, and integrated "bug-wiper garages". It is available in two separate "Classic" and "Competition" versions. The latter has strengthened outer wing panels and the new water ballast bladders moved outboard to allow a higher maximum all-up weight.

4. Type Data

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:

LBA Type Certificate Nr: 873 for DG-800 B issued 09.09.1997 (superseded)
Powered Sailplane Data Sheet No. 873 Issue 4 dated Dec 12, 1998 (superseded)

EASA Type Certificate Data Sheet number A.067 – Issue 1 dated 10 January 2006
– Model DG-800 B approved 9 September 1997
– Model DG-808 C approved 10 January 2006

LBA Musterzulassungsschein Nr. 4600 – Solo 2625 issued 16 March 1998
JAR-22(H) TCDS Number 4600 Issue 1 dated March 16th, 1998

(2) Airworthiness design requirements:

The certification basis of the DG-800 Series is Joint Airworthiness Requirements for Sailplanes and Powered Sailplanes (JAR 22) effective on June 27, 1989 (Change 4 of the English original version), plus the Preliminary Standards for Structural Substantiation of Sailplane and Powered Sailplane Components consisting of Glass or Carbon Fibre Reinforced Plastics issued May 1986 and the Preliminary guideline for the analysis of the electrical system for powered sailplanes issued February 01, 1990.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41, as the Joint Airworthiness Requirements are acceptable standards under Advisory Circular 21-1A. Three Equivalent Safety Findings were reviewed and accepted by the CAA. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23.

Equivalent Safety Finding JAR 22.51 Take-off – This requires take-off distance to be measured to 15m at a speed not less than $1.3 V_{S1}$. However NPA 22B-53 (October 1992) states this is not appropriate for “real” powered sailplanes because it is too far from the best climbing speed. The minimum should be not less than $1.15 V_{S1}$, which must be shown to be safe under all expected operating conditions. Take-off tests for the DG-800 were performed at $V_Y=90$ km/hr ($1.2 V_{S1}$).

Equivalent Safety Finding JAR 22.207(c) Stall Warning – This requires the stall warning to begin between 1.05 and $1.1 V_{S1}$, but actually occurs between 1.03 and $1.06 V_{S1}$ on the DG-800, depending on flap setting. This was justified because the aerodynamic buffet starts at an angle of attack well below the stalling incidence, and this attitude change (accompanied by only a very small speed reduction, due to the wing section characteristics) should be clearly visible to the pilot.

Equivalent Safety Finding JAR 22.1093(b) Induction System Icing Protection – No pre-heater is fitted, as the air intake is continuously warmed by its proximity to the engine. During flight testing of the DG-800 and DG-400 no carburettor icing occurred, even at -1°C . Rotax reports that no carburettor icing on two stroke engines of this and similar design is known.

(3) Environmental Certification:

See Flight Manual Section 5.3.6

(4) Certification compliance listing:

Nachweisliste (MZ) Compliance Checklist – Type: DG-800 B – dated 21.03.97

Compliance Checklist – DG-800B with enlarged vertical tail (ÄM 800-13-00 from ser.no. 8-219 on and ser.no. 8-148) – dated 20.12.2000

DG Flugzeugbau – Nachweisliste (MZ) Compliance Checklist – Type: DG-808 C Competition – JAR 22 – dated 09.09.2005

Nachweisliste (MZ) Compliance Checklist – DG-808 C Classic – dated 07.09.2005

MZ – Liste (Compliance Checklist) zur ergänzenden Musterprüfung der Motoren Baureihe 2 625 01 – Bauvorschrift: Subpart H der JAR 22, Change 5

(5) Flight manual: Flight Manual for the Motorglider DG-800B (Solo 2 625 01)
Issued March 1998 – CAA Accepted as AIR 2783

Flight Manual for the Motorglider DG-808C
Issued June 2005 – CAA Accepted as AIR 2978

(6) Illustrated Parts Catalogue:

There is a Parts List in Section 8 of the DG-800B MM

Solo Flugmotor 2 626 01/02 – Spare Parts List (Ersatzteilliste)

(7) Maintenance manual and service data for aircraft, engine and propeller:

Maintenance Manual for the Motorglider DG-800B (Solo 2 625 01) – Feb 1998

Maintenance Manual for the Motorglider DG-808C – Issued June 2005

Repair Manual for the Motorglider DG-800B – November 1997

(RM is applicable to the DG-808C as well – See TCDS CIV.3)

Manual for the Engine SOLO Type 2625 01 – Edition 1 September 24th, 1997

Solo Service – Anleitung für den Flugmotor 2 625 (Service Instructions, available in the German language only at present. English version under preparation.)

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

DG800B – CAA 2171 DG Chief of Design Dipl.Ing. Wilhelm Dirks dated 27.08.02

DG808C – CAA 2171 DG Chief of Design Dipl.Ing. Wilhelm Dirks dated 10.05.06

CAA 2171 form signed by Solo Kleinmotoren General Manager dated 9.2.2002

(9) Other information:

Übersicht über Lufttüchtigkeitsanweisungen und Technische Mitteilungen
(List of airworthiness directives and mandatory technical notes) – All technical notes are available on the manufacturer's website at www.dg-flugzeugbau.de

Solo Technische Mitteilung (Service Bulletin) Nr. 4600 - 1

5. Additional New Zealand Requirements

Compliance with the retrospective airworthiness requirements of NZCAR Part 26 is a prerequisite for the grant of a type acceptance certificate.

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	<i>To be determined on an individual aircraft basis</i>
B.2	Crew Protection Requirements - CAM 8 Appdx. B # .35	Not Applicable – Agricultural Aircraft only

Civil Aviation Rules Part 91

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
91.503	Location of Instruments and Equipment	Not Applicable – Single-seat aircraft
91.505	Shoulder Harness if Aerobatic; >10 pax; Flight Training	JAR 22.1307 – Four piece symmetrical safety harness fitted as Standard - See FM §2.13(a) Minimum Equipment and MM Section 6 for certificated options
91.505	Shoulder Harness if Aerobatic; >10 pax; Flight Training	4-point harness required equipment – See TCDS B.III-3
91.507	Pax Information Signs - Smoking, safety belts fastened	Not Applicable – Single-seat glider
91.509	Minimum Instruments and Equipment	Not Applicable – Powered gliders excepted
91.511	Night VFR Instruments and Equipment	Not Applicable – Certificated for Day VFR flight only
91.513	VFR Communication Equipment	<i>Operational requirement – compliance as applicable</i>
91.513	VFR Communication Equipment	VHF Transceiver part of the Minimum Equipment per FM §2.13(a) – Maintenance Manual Section 6 - Instrumentation and Accessories List has a list of certificated options
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 – Single-seat glider [Superseded by §104.101(5)]
91.529	ELT - TSO C91a after 1/4/97 (or replacement)	<i>Operational requirement – compliance as applicable</i>
91.531	Oxygen Indicators - Volume/Pressure/Delivery	<i>Operational requirement – compliance as applicable</i>
91.533	Oxygen for Non-Pressurised Aircraft	To be fitted as required – Optional factory oxygen system is available – see Flight Manual §7.16.2 (MM lists 6EP27M Installation Dräger oxygen system)
91.541	SSR Transponder and Altitude Reporting Equipment	<i>Operational requirement – compliance as applicable</i>
91.543	Altitude Alerting Device - Turbojet or Turbofan	Not Applicable – Glider
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 (Installation plan 8EP38 for ACK E-01 ELT is in the MM)

Civil Aviation Rules Part 104 – Gliders – Operating Rules

Subpart C - Equipment and Maintenance Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
104.101	(1) Airspeed Indicator (2) Altimeter (Adjustable for barometric pressure) (3) Magnetic Compass (4) Safety Harness for each seat (5) A First Aid Kit (6) For powered gliders (i) Fuel gauge for each main fuel tank (ii) Oil Pressure Gauge or warning device (iii) A tachometer or engine governor light (7) For IMC (i) A variometer (ii) Turn & Slip/AH (iii) Radio transceiver	Required Equipment – See Flight Manual Section 2.13 (a) (Winter 6 or 7 FMS 4 fitted as standard – See MM §6) Required equipment – See Flight Manual Section 2.13 (a) (Winter 4 FGH 10/20/40 fitted as standard – See MM §6) Fitted as Standard – See Maintenance Manual Section 6 Required Equipment – See Flight Manual Section 2.13 (a) <i>To be determined on an individual aircraft basis</i> Required Equipment – See Flight Manual Section 2.13 (a) Not Applicable – Two-stroke engine (Pre-mix fuel-oil system) Required Equipment – See Flight Manual Section 2.13 (a) (Engine parameters displayed on the DEI [Digital Engine Indicator]) } Required for Cloud Flying in the Flight Manual §2.13 (b)

Attachments

The following documents form attachments to this report:

Photographs first-of-type example DG-800B serial no. 8-279B187 ZK-GPM
Three-view drawing DG Flugzeugbau Model DG-800B
Copy of LBA Type Certificate/ Type Certificate Data Sheet Nr. 873
Copy of EASA Type Certificate Data Sheet No.EASA.A.067

Sign off

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David Gill
Team Leader Airworthiness

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Checked – AWE3 Peter Gill
Date: 27 October 2006

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
DG-800B	DG Flugzeugbau GmbH	3/21B/8	15 January 2003
DG-808C	DG Flugzeugbau GmbH	7/21B/2	27 October 2006