
Type Acceptance Report

TAR 98/10 – Revision 1

DG Flugzeugbau LS8 Series

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Executive Summary

New Zealand Type Acceptance has been granted to the DG Flugzeugbau LS8 Series glider and powered glider based on validation of EASA Type Certificate number A.047. 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(2).

1. Introduction

This report details the basis on which Type Acceptance Certificate No. 98/10 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. ICAO Type Certificate Details

Manufacturer:	Rolladen Schneider GmbH & Co. DG Flugzeugbau GmbH (from Dec 2004, s/n 8497 onwards)
Type Certificate:	EASA.A.047
Issued by:	European Aviation Safety Agency
Model(s):	LS8, LS8-a, LS8-18
MCTOW:	525 kg (1157 lb)
Max. No. of Seats:	1
Noise Standard:	Not applicable

Model(s): LS8-b, LS8-sb

MCTOW: 575 kg (1267 lb) – 18m wing span with water ballast
525 kg (1157 lb) – 15m wing span with water ballast

Max. No. of Seats: 1

Noise Standard: Not applicable

Model(s): LS8-t

MCTOW: 575 kg (1267 lb) – 18m wing span with water ballast (5” wheel)
525 kg (1157 lb) – 18m wing span with water ballast (4” wheel)
525 kg (1157 lb) – 15m wing span with water ballast

Max. No. of Seats: 1

Noise Standard: “Noise requirements for aircraft LSL” issued Jan 1st, 1991
including update from April 6, 2000

Engine: Solo 2350

Type Certificate: LBA-Data Sheet No. 4603/EN
Issued by: Luftfahrt-Bundesamt

Propeller: Technoflug KS-1-G-079-L-050-W

Type Certificate: LBA-Data Sheet No. 32.110/18
Issued by: Luftfahrt-Bundesamt

3. Type Acceptance Certificate

The application for New Zealand type acceptance of the LS8-a was from Mr M W Walker, dated 22 December 1997. The first-of-type example was serial number 8007 registered as ZK-GYZ. Type Acceptance Certificate No. 98/10 was granted on 19 December 1997 to the Rolladen Schneider LS8-a based on validation of LBA Type Certificate number 402.

The application for New Zealand type acceptance of the LS8-18 was from the aircraft manufacturer by letter dated 23 February 2000. The first-of-type examples were serial numbers 8276 and 8277, registered in December 1999 as ZK-GZA and ZK-GRZ respectively. These aircraft were initially operated in the Special experimental category, because LBA type certification was not achieved until 20 January 2000. Type Acceptance Certificate No. 0/21B/18 was granted on 1 June 2000 to the Model LS8-18.

The application for New Zealand type acceptance of the LS8-t was from the manufacturer dated 8 May 2006. The first-of-type example was serial number 8514 registered ZK-GZB. Type Acceptance Certificate No.7/21B/8 was granted to the LS8-t variant on 8 November 2006, based on validation of EASA Type Certificate number A.048. There are no special requirements for import into New Zealand. (This Type Certificate has since been cancelled and the LS8-t has been added to Type Certificate A.047 for the unpowered versions.)

This report was raised to Revision 1 to include the original Model LS8, and to combine the previous LS8-a, LS8-18 and LS8-t reports using the latest format and updating current State-of-Design responsibility to EASA. The application was from the original owner, and the first-of-type examples were serial numbers 8001 and 8006, registered ZK-GXS and ZK-GTD respectively. (Both had also been initially operated in the Special experimental category, pending completion of type certification.) The opportunity was also taken to add the current LS8-s and LS8-sb production versions, at the request of the manufacturer. (The -b designation indicates the glider has the engine bay preparation needed for retrofit of the sustainer engine.) Type acceptance was granted on 3 November 2011, based on validation of EASA Type Certificate A.047. Specific applicability is limited to the coverage provided by the operating data supplied. There are no special requirements for import.

The LS8 Series is an all-composite single-seat Standard Class 15m span glider with T-tail and provision for ballast in the wings and tail. The original Model LS8 was a development of the LS6, primarily by the deletion of flaps and the addition of winglets. The LS8-t is the powered version, and has optional 15m or 18m span winglet tips. The LS8 had LS6-c-type water ballast bags, but these did not meet the latest LBA jettison requirements. From serial number 8007 onwards it was superseded in production by the LS8-a, which had stronger spars and integral wing tanks. (The LS8 model was only approved in 2006, and added to the TCDS in 2010.) The LS8-18 is a conversion of the LS8-a to allow extended winglets to increase the wingspan out to 18m. (They are installed by threaded locating pins and are readily interchangeable. The glider can be flown in either configuration.)

Following the takeover of Rolladen Schneider and transfer of production, DG Flugzeugbau made some improvements to the basic LS8 glider with a new reinforced wing structure and modified sprung landing gear with larger mainwheel to permit a higher MAUW and allow the 18m span as an option, plus other detailed changes, which resulted in the LS8-s. The LS8-t is a self-sustaining powered variant using the “turbo” propulsion system. DG also replaced for production the original hydraulic powerplant retraction/extension mechanism with an electric worm-gear drive. This latest configuration is marketed as the LS8-st.

4. Type Data

The type data requirements of NZCAR Part 21B Para §21.43 have been satisfied by supply of the following documents:

(1) ICAO Type certificate:

EASA Type Certificate Number EASA.A.047

EASA Type-Certificate Data Sheet A.047 – Issue 05 dated 22 November 2010

- Model LS8-a approved May 17th, 1996
- Model LS8-18 approved January 20th, 2000
- Model LS8-s approved 19 August 2005
- Model LS8-sb approved 19 August 2005
- Model LS8-t approved 19 August 2005
- Model LS8 approved 31 March 2006

Supersedes:

Musterzulassungsschein Nr.: 402 – LS8-a – date of Issue 17.05.1996
Type Certificate Data Sheet No. 402 – LS8-a – Edition 1, 17.May.1996

Musterzulassungsschein Nr.: 402 – LS8-18 – date of Issue 20 Januar 2000
Type Certificate Data Sheet No. 402 – LS8-18 – Edition 1, 20.Jan 2000

EASA Type Certificate Number EASA.A.048
EASA Type Certificate Data Sheet no. A.048 – Issue 2, 10 February 2006

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the LS8 Series is the Joint Airworthiness Requirements for Sailplanes and Powered Sailplanes (JAR 22), Change 5, issued October 28th, 1995, plus the Preliminary guideline for the stress analysis of glas-fibre and carbon-fibre reinforced plastic structures for sailplanes and powered sailplanes issued July 1991, and the 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 25th, 1989. For the LS8-t the Directive for the applicability of the electrical system of powered sailplanes, reference I 334-MS 92, issued September 15th, 1992, along with the Verification procedure for the applicability of VHF transceivers in powered sailplanes, reference I 412-MSCOM/93 issued January 13th, 1993, were added.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41, because JAR 22 is the basic airworthiness standard for sailplanes called up in Advisory Circular 21-1a. Two equivalent safety findings, one exemption and one special condition were reviewed and accepted by the CAA. There are no non-compliances and no other special conditions have been prescribed by the Director under §21.23. The LS8 Series is approved for Day VFR operations, and for “*cloud flying according to the specifications in the Flight Manual without water ballast*”.

(ii) Equivalent Level of Safety Findings:

Equivalent Safety Finding JAR 22.49(b) – Compliance took into account the requirements of NPA 22B-83 “Stall speed” (dated 10th January 2002) which changed the required stalling speed with full water ballast to 90 km/h with airbrakes retracted and 95 km/h with airbrakes extended.

Equivalent Safety Finding JAR 22.473(c), 22.723, 22.725(b)/(c) – Compliance took into account the requirements of NPA 22C & D-84 dated 10.Jan.02 which specified changes in the maximum permitted c.g. acceleration during the undercarriage drop tests.

(iii) Special Conditions [LS8-s and LS8-t]:

Special Condition NPA 22C-85 Aerotowing – (JAR §22.585) This allowed a reduced load for the nose hook attachment by deleting the original 1.2 factor applied to cover surging of the cable. This was needed for steel cables but is no longer applicable to the textile cables now in use, because of their elasticity and excellent damping characteristics.

(iv) Exemptions [LS8, LS8-a/b and LS8-18]:

JAR §22.49(b)(2)(ii) – The stall speed in the landing configuration with airbrakes extended of 92 km/h is above the 90 km/h limit of §22.49(b)(2)(ii) but below the 95 km/h limit stated in NPA 22B-83. LBA accepted this higher stall speed if the landing gear is substantiated to meet the energy absorption due to a sink rate of 1.77 m/s (as in CS22) instead of 1.5 m/s as in JAR22.

(v) Airworthiness Limitations:

Section 0.4 Maintenance Manual

(See also TB 8010 – Increase of Service Life of LS8-a)

(3) Aircraft Noise and Engine Emission Standards:

(i) Environmental Standard:

The Model LS 8-t has been certificated for noise under German LSL requirements.

(ii) Compliance Listing:

See Flight Manual Section 5.3.5 – Measured Noise Level: 62.6 dB(A)

(4) Certification Compliance Listing:

Certification Compliance Checklist JAR-22, Change 5 – LS8 – Edition: Jan 2005

Certification Compliance Checklist JAR-22, Change 5 – LS8-a – 30.Apr.96

Certification Compliance Checklist JAR-22, Change 5 – LS8-sb – 24.Jan.2005

Summary of Certification data Reports LS8-18 Edition: July 1999 – Includes:

LS8-18 Master Drawing List – Edit: 15.Mär.99

Certification Compliance Checklist JAR-22, Change 5 LS8-18 Edition July 1999

Single Proof Flight LS8-18 – dated 25.Feb.1999

Aeroelastic Investigation of the sailplane LS8-18 – Including Supplements N1-4

Extensive Proof LS8-18 – Summary of Load Assumptions – dated 11.Mar.1999

Single Proof LS8-18 – Structure – dated 10.Jul.1999

Single Proof LS8-18 – Design and Construction– dated 10.Jul.1999

Single Proof LS8-18 – Operating Limitations and Information– dated 10.Jul.1999

Single Proof LS8-18 – Equipment – dated 10.Jul.1999

Single Proof LBA-requirements for tail fin water ballast systems – 10.Jul.1999

Single Proof LS8-18 – Load Tests and Appendix– dated 10.Jul.1999

LS8-t List of Certification Data Reports for the LS8-t – dated Feb 2005

LS8-t Certificate Compliance Checklist JAR 22, Change 5 – Issued 31.Jan.2005

LS8-t Single Proof – JAR-22 Subparts A through G; LBA-Requirements for Tail Fin Water Ballast Systems; Stress Analysis; Load Tests; and Appendix

(5) Flight manual: LBA-Approved Flight Manual for the LS8-18 Sailplane – Edition: July 1999 – CAA Accepted as AIR 2694

LBA-Approved Flight Manual for the LS8-a Sailplane – Edition: April 1999 – CAA Accepted as AIR 2602

EASA-Approved Flight Manual for the Powered Sailplane LS8-st
Edition: April 2005 – CAA Accepted as AIR 2979

EASA-Approved Flight Manual for the LS8 Sailplane – Edition:
January 2005 – CAA Accepted as AIR 3196

EASA-Approved Flight Manual for the Sailplanes LS8-s and LS8-sb
Edition: April 2005 – CAA Accepted as AIR 3199

(6) Operating Data for Aircraft, Engine and Propeller:

(i) *Maintenance Manual:*

Maintenance Manual for the Sailplane LS8-a – Edition: April 1999

Maintenance Manual for the LS8-18 Sailplane – Edition: July 1999

Maintenance Manual for the Sailplane LS8 (Variants LS8, LS8-a, LS8-b, LS8-18)
(combined the above original manuals in a new standardised format.) December 2009

Maintenance Manual for the Sailplanes LS8-s and LS8-sb – Edition April 2005

Maintenance Manual for the Powered Sailplane LS8-st – Edition April 2005

(ii) *Current service Information:*

Overview Technical Notes and Airworthiness Directives

(All Technical Notes are available on the manufacturer's website.)

(iii) *Illustrated Parts Catalogue:*

Not produced

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

CAA 2171 (LS8a) from Rolladen Schneider Flugzeugbau GmbH dated 07.Nov.97

Letter of undertaking (LS8-18) from Rolladen Schneider GmbH dated 23.Feb.2000

CAA 2171 (LS8-t) from DG Chief of Design Dipl.Ing. W. Dirks dated 02.05.06

Email (LS8) from DG Chief of Design Dipl.Ing. W. Dirks dated 2 November 2011

(8) Other information:

Technical Bulletin No. 8001 – Preparation for LS8-18. Structural Modifications during Manufacturing

Technical Bulletin No. 8002 – Modification from LS8-a to LS8-18. Outer Wingtips

NOTE: TB 8001/2 can only be accomplished during production. Both bulletins are only available in the German language.

Technical Bulletin No. 8014 – Conversion of sailplane LS8-b to sailplane LS-8sb

Technical Bulletin No. 8020 – Retrofit of a 5” Landing Gear (Std from S/N 8500)

TN DG-G-01 – Approved Repair Methods

TN DG-G-02 – Installation of Transponder and Aerial for Transponder

TN DG-G-03 – Installation of Instruments and Equipment

Master Drawing List – LS8-t, LS8-sb – Issued 18.01.05

Master Drawing List – LS8 – Edit: 11.Aug.95

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

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 (for the Model LS8-t), except as noted:

Civil Aviation Rules 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 §2.12
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	<i>Operational requirement – compliance as applicable</i>
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 (required for >30 min above FL100)	<i>Operational requirement – compliance as applicable</i> [Fuselage has fibreglass receptacle provision for 3 or 4 litre oxygen bottles of 100 mm in diameter. – See FM §7.13.3]
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	<i>To be determined on an individual aircraft basis</i>

Civil Aviation Rules Part 104

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 [LS8-t] (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/Artificial Horizon (iii) Radio transceiver	Fitted as Standard – See FM §9.6 Master Equipment List #1 [Specified types or any ASI meeting TSO C2 or equivalent] Fitted as Standard – See FM §9.6 Master Equipment List #2 [Specified types or any altimeter approved under TSO C10] Fitted as Standard – See FM §9.6 Master Equipment List #3 [Specified types or any compass approved under TSO C7] Fitted as Std – FM §9.6 Master Equipment List [Schroth 4-01-0.104 or Gadringer Lapbelt 5202 and Shoulder strap 2700] <i>To be determined on an individual aircraft basis</i> Required Equipment – * See Flight Manual §2.12 Not Applicable – Two-stroke engine (Pre-mix fuel-oil system) Required Equipment – * See Flight Manual §2.12 (* displayed on Engine Management Unit DEI –NT { Optional equipment – See MM §6.6 for approved types { Optional equipment – See MM §6.6 for approved types { Optional equipment – See MM §6.6 for approved types

Attachments

The following documents form attachments to this report:

- Photographs first-of-type example LS8-18 serial number 8277 ZK-GRZ
- Three-view drawing Rolladen-Schneider Model LS8-18
- Photographs of first-of-type example LS8-t serial number 8514 ZK-GZB
- Three-view drawing DG Flugzeugbau Model LS8-st
- Copy of Type Certificate Data Sheet Number EASA.A.047

Sign off

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David Gill
Team Leader Airworthiness

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Checked – Greg Baum
Airworthiness Engineer

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
LS8-a	M W Walker	98/21B/10	19 December 1997
LS8-18	DG Flugzeugbau GmbH	01/21B/18	8 November 2003
LS8-t	DG Flugzeugbau GmbH	7/21B/8	8 November 2006
LS8, LS8-s, LS8-sb	White/McIntyre Syndicate	12/21B/5	3 November 2011