
Type Acceptance Report

TAR 11/21B/25 – Revision 2

Jonker JS1 “Revelation” Series

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Executive Summary

New Zealand Type Acceptance has been granted to the Jonker JS1 “Revelation” series based on validation of SACAA Type Certificate number J15/12/550. 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(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.11/21B/25 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 in New Zealand; and
- (b) Identify any special conditions for import applicable to any model 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. Aircraft Certification Details

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

Manufacturer: Jonker Sailplanes (Pty) Ltd (since July 2013)
Jonker Sailplanes cc

Type Certificate: J15/12/550

Issued by: South African Civil Aviation Authority

Production Approval: SACAA Part 148 Manufacturing Organisation M667

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

(i) **Model:** JS1-A “Revelation” JS1-B “Revelation”
JS1-C 18 “Revelation” JS1-C 21 “Revelation”

MCTOW: 600 kg (with water ballast) – JS1-A, JS1-B, JS1-C 18
437 kg (without)
720 kg (with water ballast) – JS1-C 21
520 kg (without)

Noise Standard: N/A

Engine: MD-TJ42 (Jet Sustainer option)

Type Certificate: EASA.E.099
Issued by: European Aviation Safety Agency

3. Application Details and Background Information

The application for New Zealand type acceptance was from the New Zealand agent, J S Sailplanes Ltd dated 23 May 2011. As part of the type acceptance exercise the CAA sent a certification specialist to the Jonker factory at Potchefstroom for a validation visit in July 2011. (See CAA Validation Visit Report dated 28 July 2011.)

Type Acceptance Certificate No. 11/21B/25 was granted on 21 November 2011 to the Jonker JS1-A and JS1-B based on validation of SACAA Type Certificate J15/12/550. Specific applicability is limited to the coverage provided by the operating documentation supplied. There are no special requirements for import into New Zealand.

The Jonker JS1-A and JS1-B are single-seat 18m class sailplanes constructed from composite materials equipped with winglets, water ballast provisions, full-span flaperons, and upper-surface airbrakes. The configuration includes a shoulder-mounted wing, T-type empennage and retractable main landing gear. The JS1-B is identical to the JS1-A except for a smaller tailplane and tail surfaces and is the main production model after s/n 004.

The Jonker JS1-A and JS1-B sailplanes are the first indigenous aircraft Type Certificated by the South African Civil Aviation Authority.

Revision 1 to this report was raised to add the JS1-C 18 and JS1-C 21 models under work request 14/21B/17 following application from the manufacturer. The JS1-C models are identical to the JS1-B except the outer wing is removable, with two different span wing tips available, 18m and 21m. The JS1-C has been the standard production model since s/n 034. The JS1-C 21 has wing-tip water tanks and an increased maximum weight, but is not eligible for cloud flying or basic aerobatics.

This report was raised to Revision 2 to add the jet sustainer option, which is an option defined by MDL C.JS-059. Retrofit to existing aircraft is also possible using Technical Note TN.JS-016, which references the P.JS-083 Jet Sustainer Installation Procedure. Type Acceptance was granted on 14 October 2016.

The JS1 Jet Sustainer System uses a turbine engine mounted on a retractable pylon in the rear section of the fuselage, controlled by the Jet Display Unit (JDU) on the instrument panel. Data from the JDU is sent to the Electronic Computer Unit (ECU) where the data is processed. Various control inputs include; extension/retraction, start-up/shutdown and desired throttle setting. RPM is regulated by the ECU by adjusting the fuel pump voltage. Pylon extension/retraction kinematics is contained inside the jet box. An electromechanical actuator controls the pylon position, which is connected through a cam and bell-crank system allowing the jet doors to open in sequence with the movement of the pylon.

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:

(1) ICAO Type certificate:

SACAA Type Certificate J15/12/550 issued 12 March 2010

SACAA Type Certificate Data Sheet J15/12/550 Issue 5.0 dated 31 May 2016

– Models JS1-A, JS1-B approved 12 March 2010

– Models JS1-C 18, JS1-C 21 approved 23 May 2013

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of all JS1 models is the Certification Specifications for Sailplanes and Powered Sailplanes (EASA CS-22) at initial issue dated 14 November 2003.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41, as CS-22 is the successor to JAR-22 which is an acceptable certification basis for sailplanes and powered sailplanes in accordance with Advisory Circular 21-1A. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23.

(ii) *Special Conditions:*

Jet Sustainer System:

SC 2011-01 CS 22.361 Engine Torque – For turbine engines the mounts and supporting structure must be designed for the limit engine torque load imposed by sudden engine stoppage due to malfunction or structural failure (such as compressor jamming) or maximum acceleration.

SC 2011-02 CS 22.901 Installation – The engine must be accessible for pre-flight checks. For turbine engine installations the resultant carcass vibration characteristics must not exceed TC values.

SC 2011-03 CS 22.903 Engines – Turbine engine installations must minimise hazards due to a rotor failure or fire which burns through the engine case, and have controls which ensure that critical operating limitations will not be exceeded. Risks during start due to fire or mechanical damage must be minimised; there must be means to stop combustion and engine rotation if required, and to discharge fuel or vapour following a false start.

SC 2011-04 CS 23.939 Powerplant Operating Characteristics – Flight testing must be carried out to determine there are no hazardous operating characteristics (such as stall, surge or flameout) during all expected operations. The air inlet system must not cause harmful engine vibration.

SC 2011-05 CS 23.1043 Cooling Test – General requirements, maximum ambient atmospheric temperature, and correction factors, were adapted from CS23 equivalent paragraphs.

SC 2011-06 CS 23.1045 Cooling Test Procedure for Turbine Engine-Powered Aeroplanes – Requirements were again adapted from CS23 paragraphs and Acceptable Means of Compliance.

SC 2011-07 CS 22.1091 Air Induction – There must be means to prevent hazardous quantities of fuel leakage or overflow (drains or vents) entering the engine and their accessories intake system.

SC 2011-08 CS 22.1093 Induction System Icing Production – Each turbine engine and its inlet system must operate throughout its flight power range (including idle) without excessive ice build-up that would adversely affect engine operation or cause significant power loss under icing conditions.

SC 2011-09 CS 22.1103 Induction System Ducts – Each flexible induction system must be able to withstand the effects of temperature extremes and various contaminants (oil, fuel, water, solvents) to which it would be exposed in service and maintenance without deterioration or delamination.

SC 2011-10 CS 22.1121 (Exhaust System) General – If significant traps exist each turbine exhaust must have drains discharging clear of the aircraft to prevent accumulation of fuel following an attempted restart. For CS 22.603 compliance any exhaust system failure will affect safety.

(iii) *Equivalent Level of Safety Findings:*

CS 22.221 – (Letter TC-JS1-CS22.221_2) With fully asymmetric water ballast the aircraft cannot recover from a spin within one extra turn and requires a configuration change to do so. Jonker showed that a single failure to the water ballast system that would lead to a full asymmetry condition was highly unlikely to occur in service.

CS 22.779 – (Issue Paper D-1) for the throttle type used for the jet sustainer system – RPM is controlled through the JDU using a rotary knob. This does not meet CS 22 in terms of motion and effect, but the direction of movement matches the direction of the JDU display, and it conforms to human factor requirements as set out in UK CAA CAP 719. In addition field tests of the instrument and throttle were successful as shown by positive feedback from pilots as being intuitive to operate.

CS 22.1191(b) – (Issue Paper E-1) engine isolation from rest of the sailplane for and fire-resistance of parts behind opening in the engine compartment cowling for CS 22.1193(d) – The engine isolation requirements are met in the operational (extended position), but not when retracted, when the following features provide sufficient prevention of fire: Mechanical Emergency Fuel and Electrical Fuel Shut-offs; Solid state software design preventing adverse engine operation in retracted modes; Type of fuel used (low-volatility diesel); Warning light (of high temperatures) displayed on JDU. For the fin, which is in the jet efflux, the separation distance exceeds the 600mm mandated in the Specification and testing on heating of the fin showed that the temperature of the structure does not exceed the glass transition temperature of the composite being used.

(iv) *Airworthiness Limitations:*

Section 4 of the applicable Maintenance Manual. The airframe has a service life of 12,000 hours, and requires special inspections at set intervals to reach this figure. The MD-TJ42 (at MM Issue 1) has a life limit of 449 starts, 50 hours or 6 years.

(3) Aircraft Noise and Engine Emission Standards:

(i) *Environmental Standard:*

N/A – unpowered glider, or sustainer engine only.

Compliance Listing:

N/A

(4) Certification Compliance Listing:

JS1 Type Certification Conformance Statement – Document No C.JS-007 Issue 1.0 dated 20/10/09

JS1C TC Amendment – Compliance Checklist and CAA LOI Matrix – Document C.JS-102 Issue 1.0 dated 27/1/12

JS1B Type Certificate Amendment 1 – Certificate Compliance Plan – Document C.JS-028 Issue 3.8 dated 26 November 2014

JS1 C TJ Certification Compliance Statement – Document Number: C.JS-138

- (5) Flight Manual: SACAA approved Flight Manual for the Jonker JS1 Revelation Document No 1A-5.04.10 – CAA accepted as AIR 3192
Document 1A-5.04.50 JS1 Jet Sustainer Flight Manual Supplement

- (6) Operating Data for Aircraft:

(i) *Maintenance Manual:*

JS1 Revelation Maintenance Manual – Document No 1A-5.04.20

JS1 Revelation Repair Manual – Document No C.JS-027

JS1 Jet Sustainer Maintenance Manual – Document No 1A-5.04.80

Current service Information:

JS1 Revelation Service Bulletins and Technical Notes

(ii) *Illustrated Parts Catalogue:*

JS1 Revelation Illustrated Parts Catalog Document No C.JS-026

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

CAA 2171 signed by J Jonker, Accountable Manager, dated 28th July 2011

Current documentation is available through the website: www.portal.js-sales.co.za

5. New Zealand Operational Rule Compliance

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 – Applies to 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:

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	4-point harness required equipment – See TCDS Min Eqpt
91.507	Pax Information Signs – Smoking, safety belts fastened	Not Applicable – 10 seats or more only
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>
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
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 (jet sustainer option) – (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	Required as Minimum Equipment – See TCDS Minimum Equipment Required as Minimum Equipment – See TCDS Minimum Equipment <i>To be determined on an individual aircraft basis</i> Required as Minimum Equipment – See TCDS Minimum Equipment <i>To be determined on an individual aircraft basis</i> Displayed by the electronic Jet Display Unit (JDU) Not Applicable – Total loss fuel pre-mix system Displayed by JDU (required equipment with MD-TJ42 engine) <i>Operational requirement – compliance as applicable</i>

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.

3. Some means of compliance above are specific to a particular model/configuration. Compliance with Part 91/119 operating requirements should be checked in each case, particularly oxygen system capacity and emergency equipment.

Attachments

The following documents form attachments to this report:

Three-view drawing Jonker JS1-B
Copy of SACAA Type Certificate Data Sheet J15/12/550

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>
JS1-A, JS1-B	J S Sailplanes Ltd	11/21B/25	21 November 2011
JS1-C 18, JS1-C 21	Jonker Sailplanes Pty Ltd	14/21B/17	4 June 2014
Jet Sustainer System	J S Sailplanes Ltd	16/21B/27	14 October 2016