
Type Acceptance Report

TAR 8/21B/14

CESSNA 510

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Executive Summary

New Zealand Type Acceptance has been granted to the Cessna 510 based on validation of FAA Type Certificate number A00014WI. 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).

1. Introduction

This report details the basis on which Type Acceptance Certificate No.8/21B/14 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:	Cessna Aircraft Company
Type Certificate:	A00014WI
Issued by:	Federal Aviation Administration
Model:	510
MCTOW	8645 lb. [3877 kg.]
Max. No. of Seats:	6
Noise Standard:	FAR 36 (Stage 4)
Engine:	Pratt & Whitney Canada PW615F-A
	Type Certificate: E-34
	Issued by: Transport Canada
	(FAA Type Certificate E00073EN)

3. Type Acceptance Details

The application for New Zealand type acceptance of the 510 was from the manufacturer, dated 5 October 2007. The first-of-type example was serial number 510-0054, to be registered ZK-MUS. The Model 510 is an entry-level 6-seat twin turboprop very light jet. As part of the validation process a CAA certification specialist visited Cessna in Wichita.

Type Acceptance Certificate No. 8/21B/14 was granted on 27 March 2008 to the Cessna Model 510 based on validation of FAA Type Certificate A00014WI. (The PW615F-A engine is covered by Type Acceptance Certificate number 8/21B/21.) Specific applicability is limited to the coverage provided by the operating documentation supplied. For operation in New Zealand the Model 510 must have the optional 40 cu. ft. oxygen bottle fitted.

The Model 510 Citation Mustang is an all-new design of light business jet of conventional all-metal construction with seating for four passengers and a toilet. The configuration is similar to previous Citations with a T-tail, speedbrake-equipped and a low wing with slight leading edge sweep. The cockpit uses the Garmin G1000 electronic avionics/instrument system with dual 10 inch Primary Flight Displays and one 15 inch Multi-Function Display. The aft-mounted 1460 lb. thrust PW615F engines are FADEC-equipped. V_{MO}/M_{MO} is 250 KCAS/0.63M and maximum operating altitude is 41,000 feet. The Model 510 is approved for single pilot IFR operation and flight into known icing conditions.

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) ICAO Type certificate:

FAA Type Certificate Number A00014WI
FAA Type Certificate Data Sheet number A00014WI at Revision 1 dated 19.09.06
– Model 510 approved September 8, 2006

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the Cessna 510 is FAR Part 23 effective 1 February 1965, including Amendments 23-1 through 23-54. This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1, as FAR 23 is the basic standard for Normal Category Airplanes called up under Part 21 Appendix C. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23.

(ii) *Special Conditions:*

No. 23-158-SC Protection of Systems for High Intensity Radiated Fields – There must be shown to be no adverse effects for the critical EFIS, ADA and FADEC systems on the Model 510 aircraft resulting from exposure to the HIRF spectrum specified in this SC.

No. 23-181-SC Flight Performance, Characteristics and Operating Limitations – Because the Model 510 has high performance not typical of previous Part 23 type aircraft this SC applied a range of additional requirements which are similar to FAR 25 and the Commuter Category.

No. 23-192-SC Full Authority Digital Engine Control System – This SC required an evaluation of 23.1309(a) through (e) at Amendment 23-49 to the digital electronic engine control systems to check for the possible effects, including environmental, on or by other aircraft systems.

No. 23-193-SC Turbofan Engines and Engine Location – With the engines mounted aft on the fuselage of the Model 510 there is no early visual indication of an engine fire. Therefore a SC was imposed to require a fire extinguishing system in each engine compartment with specific extinguishing agent and container properties, discharge distribution and functional requirements.

(iii) *Equivalent Level of Safety Findings:*

ACE-05-8 §23.1305(c) and §23.1549 – Digital Indication of N2 and FF – The 510 has digital only presentation of High-Pressure Turbine Rotor Speed N2 and Fuel Flow indication. The N2 indicator is used for overspeed monitoring only, as engine speed is automatically controlled by the FADEC system, while there is no FF limit. The indication locations are such that rate-of-change information is readily discernible and they meet requirements for visibility, including lighting conditions and vibration.

ACE-05-9 §23.1555(d)(1) – Usable Fuel Quantity Marking – The Model 510 fuel gauge provides a direct reading of fuel quantity available calibrated in appropriate units for a turbofan powered aircraft.

ACE-05-10 §23.807(e) – Ditching Emergency Exits – Cessna uses a “water barrier” at the main cabin entry door to provide an emergency exit above the waterline on the LHS of the aircraft. This was accepted, as on previous Citation models, because it is the secondary escape route and the simplicity of the design is such that no training or experience is required to deploy the water barrier.

ACE-05-11 §23.841(b)(6) – Cabin Pressurization for High Altitude takeoff and Landing Operations – The 510 is certified for operations from airports up to 14,000 feet elevation. The rule requires a warning when cabin altitude exceeds 10,000 feet. To avoid nuisance indications the system inhibits warnings under specific conditions for high altitude operations.

ACE-05-12 §23.1435(a)(2) – Hydraulic Pressure Indication – Cessna uses two EICAS messages to provide information to the crew about the pressure in the hydraulic system in place of a pressure gauge, in conjunction with associated Flight Manual procedures.

ACE-05-23 §23.1447(e) – Passenger Oxygen Dispensing Units – At cold temperatures the passenger oxygen masks become stiff and will not unfold and fall from the dispensing unit stowage box for presentation to the passengers. To ensure easily accessible emergency oxygen to passengers in case of cabin decompression the 510 uses a streamer attached to the oxygen mask.

ACE-05-28 §23.841(a) – Cabin Pressurisation – Cabin altitude must not exceed 15,000 feet in the event of any probable failure or malfunction of the system. Because it is designed for high altitude airport operations, there are circumstances where the 510 cabin altitude will briefly overshoot the limit. This was accepted because this short exposure will not prevent the crew from safely operating the aircraft or cause permanent physiological damage to the occupants.

ACE-06-03 §23.1545(b)(4) – Airspeed Indicator – The 510 has only a digital ASI display which does not fully comply with flap operating range marking requirements. A digital display must also provide equivalent sensory cues. The 510 display was accepted because the rolling scale and number presentation, along with colour coding and flags, provide additional compensating factors.

(iv) *Airworthiness Limitations:*

See Maintenance Manual, Chapter Four

(3) Aircraft Noise and Engine Emission Standards:

(i) *Environmental Standard:*

The Model 510 has been certificated under FAR Part 34, including Amendments 34-1 through 34-3, and FAR Part 36, including Amendments 36-1 through 36-26.

(ii) *Compliance Listing:*

Cessna Dynamics Report No.D-510-231 – Model 510 – FAR 36 Noise Test Results (Flyover – 73.9; Lateral – 85.0; Approach 86.0; Stage 4 Margin 26.1 EPNdB)

(4) Certification Compliance Listing:

Cessna Report AW-510-001 – Configuration and Continued Airworthiness Report

Cessna Report No. AW-510-002 – Model No. 510 – Master Compliance Checklist

Cessna Report No. PR-510-005 – Model No. 510 – Master Drawing List

Cessna Report No. S-510-1001 – Model No. 510 – Structural Substantiation

Cessna Engineering Flight Test Report No. FT510-12 – Avionics Systems

Cessna Report EL-510-402 – HIRF and Indirect Effects of Lightning Compliance

Cessna Report No. EV-510-101 – Model 510 – Oxygen System Compliance Report

Cessna Report No. C-510-99 – Model No. 510 – Structural Substantiation, Interiors

Cessna Report No. C-510-106 – Model 510 – Crashworthiness Evaluation, Interiors

(5) Flight Manual: FAA-Approved Airplane Flight Manual Citation Mustang – Serial Number 510-0001 through -0004 Incorporating SL510-99-1 and 510-0005 and On – P/N 510FM – CAA Accepted as AIR 3020

(6) Operating Data for Aircraft and Engine:

(iii) *Maintenance Manual:*

Publication 510MM – Model 510 Maintenance Manual

Publication 510WD – Model 510 Wiring Diagram Manual

Publication 510SR – Model 510 Structural Repair Manual

Publication 510ND – Model 510 Nondestructive Testing Manual

Publication 510WB – Model 510 Weight and Balance Manual

Publication 510TE – Model 510 Illustrated Tool and Equipment Manual

Publication 510CM – Model 510 Component Maintenance Manual

(iv) *Current service Information:*

Model 510 Service Bulletins and Service Letters

(v) *Illustrated Parts Catalogue:*

Publication 510PC – Model 510 Illustrated Parts Catalogue

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

CAA 2171 from Cessna Director of Airworthiness & Product Safety dated 05.10.07

(8) Other information:

Citation Mustang – Specification and Description – September 2006

Citation Mustang – Optional Equipment Selection Guide – June 2007 – Effective for Aircraft to be Delivered in 2008 – Units 510-0053 and On

Publication 510OM – Citation Mustang Operating Manual

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, except as noted:

Civil Aviation Rules Part 91

Subpart F – Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
91.505	Seating and Restraints – Safety belt/Shoulder Harness	FAR §23.785/ FAR §23.2
91.507	Pax Information Signs – Smoking, safety belts fastened	Not Applicable – Less than 10 passenger seats
91.509 Min. VFR	(1) ASI (2) Machmeter (3) Altimeter (4) Magnetic Compass (5) Fuel Contents (6) Engine RPM (7) Oil Pressure	FAR §23.1303(b)(1) * FAR §23.1303(c)(2) * FAR §23.1303(b)(2) * FAR §23.1303(a)(3)) * FAR §23.1305(a)(2) * FAR §23.1305(c)(3) * FAR §23.1305(a)(4) *
		(8) Coolant Temp (9) Oil Temperature (10) Manifold Pressure (11) Cylinder Head Temp. (12) Flap Position (13) U/c Position (14) Ammeter/Voltmeter
		Not Applicable – Turbojet FAR §23.1305(a)(6) * Not Applicable – Turbojet Not Applicable – Turbojet FAR §23.699 * FAR §23.729(e) * FAR §23.1351 (b)(6) *
91.511	Night VFR Instruments and Equipment	* Fitted as Standard
91.513	VFR Communication Equipment	* Fitted as Standard
91.517	IFR Instruments and Equipment	* Fitted as Standard
91.519	IFR Communication and Navigation Equipment	* Fitted as Standard
	* Garmin G1000 Integrated Instrument and Avionics System has dual GDC74B Air Data Computers; dual GRS77 Attitude Heading Reference Systems; Dual GMU44 magnetometers; dual GIA63W with VHF Nav/Comm and GPS; single KN63 DME; dual GMA1347D audio control panels; and GWX68 weather radar, Fitted as Standard. Note: The Model 510 is approved for Day and Night VFR and IFR, and Flight Into Known Icing Conditions	
	RVSM – Model 510 is certificated and equipped as standard for RVSM Operations (See Flight Manual Page 2-21) RNP/BRNAV – Model 510 is approved under FAA AC 20-138A to RNP5/BRNAV and RNP-1 (See AFM Page 2-30)	
91.523 Emrgcy Eqpmt.	(a) More than 9 pax - First Aid Kits/Fire Extinguishers (b) More than 20 pax - Axe readily accessible to crew (c) More than 61 pax - Portable Megaphones per Table 9	Not Applicable – Less than 10 passenger seats Not Applicable – Less than 20 passenger seats Not Applicable – Less than 61 passenger seats
91.529	ELT – TSO C91a after 1/4/97 – C126 after 22/11/07	Artex C406-N Fitted as Standard
91.531	Oxygen Indicators - Volume/Pressure/Delivery	FAR §25.1441 and FAR §25.1443
91.535	Oxygen for Pressurised Aircraft (1) Flight Crew Member On-Demand Mask; 15 min PBE (2) 1 Set of Portable 15 min PBE (3) Crew Member - Pax Oxygen Mask; Portable PBE 120l (4) Spare Oxygen Masks/PBE (5) Minimum Quantity Supplemental Oxygen (6) Required Supplemental/Therapeutic Oxygen Above FL250 - Quick-Donning Crew On-Demand Mask - Supplemental O ₂ Masks for all Pax/Crew - Supplemental Mask in Washroom/Toilet Above FL300 - Total Outlets Exceed Pax by 10% - Extra Units Uniformly Distributed - Automatically Presented Above FL140 - Manual Means of Deploying Pax Masks	Maximum Operating Altitude is 41,000 ft. (Model 510 Oxygen System is similar to the Model 525). EROS MC10-16-101 TSO C89/99 Quick-donning pressure demand masks are provided at each pilot seat; Automatic dropout constant-flow TSO C64a oxygen masks are provided in the cabin: Two double units above the club seats and one single unit by the toilet. Oxygen bottle contents displayed on cockpit gauge. Cessna calculates a minimum quantity of 749 litres of oxygen to meet the requirements of §91.535(a)(4) & (5). Therefore OPTIONAL 40 cu. ft. bottle MUST BE FITTED. To allow high altitude airport operations, pax oxygen masks are only made available automatically at 14,800 ± 200 feet. Exemption 8/EXE/40 against §91.535(d)(3) was granted.
91.541	SSR Transponder and Altitude Reporting Equipment	Dual GTX33/D Mode S transponders Fitted as Standard
91.543	Altitude Alerting Device - Turbojet or Turbofan	* Fitted as Standard
91.545	Assigned Altitude Indicator	N/A – Altitude alerting device fitted
A.15	ELT Installation Requirements	<i>To be determined on an individual aircraft basis</i>

Civil Aviation Rules Part 135

Subpart F – Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
135.355	Seating and Restraints – Shoulder harness flight-crew seats	FAR §23.785/ FAR §23.2
135.357	Additional Instruments (Powerplant and Propeller)	Certificated to FAR Part 23, including §23.1305
135.359	Night Flight	Landing light, Pax compartment
135.361	IFR Operations	Speed, Alt, spare bulbs/fuses
135.363	Emergency Equipment (Part 91.523 (a) and (b))	<i>Operational requirement – Compliance as applicable</i>
135.367	Cockpit Voice Recorder	N/A – Only for 2-crew helicopters with more than 10 pax
135.369	Flight Data Recorder	Not Applicable – Less than 10 passenger seats
135.371	Additional Attitude Indicator	Fitted as Standard (Mid-Continent P/N S3100-432)

Attachments

The following documents form attachments to this report:

Photographs first-of-type example Cessna 510 s/n 510-054 ZK-MUS
 Drawing 7000510 - Model 510 Three View and General Arrangement
 Copy of FAA Type Certificate Data Sheet Number A00014WI

Sign off

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 David Gill
 Team Leader Airworthiness

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 Checked – Peter Gill AWE3
 Date: 27 March 2008

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
510	Cessna Aircraft Company	8/21B/14	27 March 2008