AIRWORTHINESS APPROVAL NOTE NO: 27332

APPLICANT: Cessna Aircraft Company

AIRCRAFT TYPE: Cessna Citation 560XL (Excel)

REGISTRATION NO: - CONSTRUCTOR'S NO: -

OPERATOR:

DESIGN ORGANISATION: Cessna Aircraft Company

CERTIFICATE CATEGORY: Transport Category(Passenger)

Type Certification of Cessna Citation 560XL (Excel)

1. Introduction

This AAN has been raised to record the basis for CAA Type Certification of the Cessna Citation 560 Excel.

Evaluation of the Cessna Citation 560 Excel by CAA commenced with visits in December 2000 and January 2001. At the conclusion of these visits the company was presented with an Evaluation Summary and this formed the basis for the work subsequently carried out by Cessna for Type Certification.

The Cessna Citation 560 Excel is a version of the Model 560 Ultra embodying a number of design changes at aircraft serial number Block Point Change (BPC) Serial No. 560-5001 and on.

For reference the Cessna 560 Citation developments are identified as follows :-

Cessna 560 Citation V - Aircraft Serial No. 560-0001 to 560-0259 inclusive
Cessna 560 Citation Ultra - Aircraft Serial No. 560-0260 to 560-0538 inclusive
Cessna 560 Citation Encore - Aircraft Serial No. 560-0539 to 560-5000 inclusive
Cessna 560 Citation Excel - Aircraft Serial No. 560-5001 onwards.

2. Aircraft Build Standard

The Cessna Citation 560 Excel is a version of the Model 560 Ultra which the CAA has already certificated as described in CAA Evaluation Report No 9/30/ALA11301/2 dated June 1994, reference AAN21933 Issue 2. In view of this, the CAA evaluation concentrated on design changes introduced at serial number block point change S/N 560-5001 and on.

The Cessna Citation 560 Excel is described in detail in CAA Evaluation Report no. 9/33/3544/A27332 dated July 2001. The main design changes introduced at Serial No. 560-5001 are listed below.

- Weight changes as detailed below.

	Excel	Ultra
Max Take-Off	9072 kg (20000 lbs)	7393 kg (16300 lbs)
Max Landing Weight	8482 kg (18700 lbs)	6894 kg(15200 lbs)
Max Zero Fuel Weight	6804 kg (15000 lbs)	5534 kg (12200 lbs)

- Introduction of P&WC PW545A engines (3804 lbs) - compared to P&WC JT15D-5D (3045 lbs) for the Ultra.
- Electronic Engine Control EEC with manual mode dispatch option.
- Introduction of an optional Honeywell RE100[XL] APU.
- Provisioning for single point pressure fuelling. Similar to 560 Encore option.
- The cabin section of the fuselage is increased in diameter from the diameter of the Model 560 to a diameter similar to the Model 650 / 750 Series aircraft. The occupant capacity increases by a maximum of one passenger to 2 pilots and 7 to 12 passengers (depending on customer options).
- New seating arrangements with single and multiple place side facing seat options.
- Larger Cessna Citation 650 style main cabin door.
- Light weight vertical fin.
- Graphite elevator trim tab.
- The tailcone section of the Model 650 Series fuselage is modified to accommodate the different engine mounts/pylons and to couple the empennage to the larger fuselage.
- The planform of the Model 560 wing is altered by lengthening the carry-through structure and bending it beneath the fuselage pressure shell. Similar in construction and attachment to the Model 525. The existing Model 560 wing structure between the points of attachment to the carry-through and the existing wing tip remain the same. The existing flaps and ailerons are used. There is a wing tip extension. Total wing span is 55.7 ft. The existing Model 560 Ultra wing span is 52.2 ft.
- The main landing gear design is changed from the existing Model 560 to a trailing link design. Similar to 550 Bravo & 560 Encore designs.
- Carbon brakes instead of steel.
- A 2-position horizontal stabiliser positioned at -2° for take-off and landing and +1° for cruise.
- Relocation of the elevator and rudder hinge lines to improve control forces and removal of the elevator balance horn.
- Anti-ice/de-ice methods are similar to the Model 560, except that inboard bleed air anti-ice is extended to the full wing leading edge.
- Electric heating for windshield anti-ice protection, replacing the Ultra bleed air system.
- Increase in maximum operating differential pressure from 8.9 psi to 9.3 psi.

The principal operating parameters for the aircraft are as follows:

	Excel	Ultra
Vmo s.l. - 8000 ft.	261 KCAS	260 KCAS
Vmo 8000 ft - 26,515 ft. Excel	306 KCAS	290 KCAS
Mmo above 26,515 ft. Excel	0.752 Mach	0.75 Mach

Maximum operating altitude:- 45000 ft, as per the Ultra.
The evaluation was based on aircraft serial no. 560-5001 and prototype 0706 as defined by Drawing Number 6600000-1 revision AC, plus optional Cessna Aircraft Company Engineering Change Request (ECR's) (and equivalent Service Bulletins), as approved by the FAA and identified within CAA Engineering Evaluation Report No 9/33/3544/A27332.

3. Approval Procedures

This aircraft /validation has been carried out in accordance with BCAR B2-2.

4. Basis Of Validation

4.1 CAA Validation Basis For The Aircraft

The Cessna Citation 560 Excel is described in detail in CAA Evaluation Report no. 9/33/3544/A27332 dated July 2001.

Subsequent to the CAA evaluation and presentation of CAA's findings Cessna have presented substantiating data in respect of all open items the outcome of which is that a final list of Additional Requirements for Import was identified and published in Draft Issue 3 dated July 2001.

In addition to the Equivalent Levels of Safety identified (a) through (h) below from the FAA TCDS A22CE, a further Equivalent level of Safety was identified during the CAA investigation. The additional Equivalent Level of Safety relates to compliance with JAR / FAR 25.1203, fire detection system for the engine core fire zone, reference item (i).

(a) JAR / FAR 25.807(e), Emergency exits ditching;
(b) JAR / FAR 25.815, Passenger cabin aisle width;
(c) JAR / FAR 25.813(e), Lavatory door installation between passenger compartments;
(d) JAR / FAR 25.811(d)(1); 25.812(b)(1)(i), Emergency exit markings and locator signs;
(e) JAR / FAR 25.841(b)(6), Takeoff and landing operations at high elevation airports;
(f) JAR / FAR 25.1549(a) and (b), Digital only display of turbine engine N2;
(g) JAR / FAR 1.1; 1.2; 25.101; 25.105; 25.109; 25.113; 25.115; 25.735; and 25.1587, Rejected takeoff distance and landing performance criteria (includes worn brake criteria);
(h) JAR / FAR §§ 25.1305(a)(4), (a)(5), (a)(6), (c) (1) and (c)(3), and 25.1549(a) through (d), Digital only display of APU engine rotor speed, exhaust gas temperature and no indication of oil pressure or oil temperature;
(i) JAR / FAR 25.1203(a), Fire-detector System.

The following exceptions / reversions were granted by the FAA and have been endorsed by the CAA :-

(a) JAR / FAR 25.571(e)(1) Damage-tolerance and fatigue evaluation of structure. Effective Amendment 25-82 - Exception - 25.571(e)(1)

(b) JAR / FAR 25.671 Control Systems
Effective Amendment 25-82
Amendment 25-82 - Applicable to the 2-position horizontal stabiliser. Exception - None. All other aircraft control systems. Original Issue Applicable (25-1 through 25-17) Exception - § 25.671 as amended by Amendments 25-23 and later, not applicable

(c) JAR / FAR 25.677 - Trim Systems
Effective Amendment 25-82
Applicable to the 2-position horizontal stabiliser. Exception - None
All other aircraft trim systems. Original Issue Applicable (25-1 through 25-17)
Exception - § 25.677 as amended by Amendments 25-23 and later, not applicable

(d) JAR / FAR 25.1309 - Equipment, Systems, and Installations
Effective Amendment 25-82
Applicable to Electronic Flight Instrument systems (Honeywell Primus 1000 Cockpit Display), Flight Guidance, hydraulic, electrical, pressurisation system, and 2-position horizontal stabiliser only. Exception - None
All other aircraft systems Original Issue Applicable (25-1 through 25-17)
Exception -25.1309 as amended by Amendments. 25-23 and later, not applicable.

It should be noted that the FAA exceptions granted against the following requirements have not been accepted by the CAA and are included in the CAA validation basis :-

(a) JAR / FAR 25.562 Emergency landing dynamic conditions.
(b) JAR / FAR 25.631 Bird strike damage.

The following Additional Requirements for Import (ARI's) have been established to satisfy the CAA applicable Airworthiness requirements :-

AR1 Introduction

No action is required on this item.

AR2 Changes in Design

Not a type certification item.

AR3 Applicable CAA Requirements

As contained in Cessna Citation 560 Excel Evaluation Report no. 9/33/3544/A27332 dated July 2001.

AR4 Additional Requirements (Type Certification)

4.1.1 Flight

10(2) Standby Instruments - Citation 560 V and Citation 560 Ultra, up to and including Serial No. 560-0538.

With the aircraft in a 2 display EFIS configuration, the acceptability of the standby artificial horizon location is dependent upon there being a full set of instruments on the co-pilots side, usable under emergency power conditions.

Therefore, for compliance with BCAR Chapter D6-10 both the co-pilot's pitot-static heaters and the co-pilots altimeter illumination must be powered from the emergency electrical system.

12(4) Altimeters - Citation 560 V and Citation 560 Ultra, up to and including Serial No. 560-0538.

All altimeters installed on the flight deck must have their pressure setting subscale calibrated in millibars or combined millibars and inches of mercury.

12(6) Colour of Heading Indication - Citation 560 Ultra Serial Nos. 560-0260 to 560-0400 inclusive.

The instantaneous heading indication is displayed in white whilst all other current information, e.g. airspeed, is displayed in green whilst in the arc mode. The colour coding for all these types of data should be consistent. (AMJ 25, paragraph l 1,5a).

4.1.2 Performance

None.

4.1.3 Structures

(1) Birdstrike Damage Protection - Citation 560 Encore Serial No. 560-0539 and onwards up to and including Serial No. 560-5000.

To comply with JAR 25.631, the following areas must be provided with adequate protection to ensure continued safe flight and landing of the aeroplane, following an impact with a 4 lb bird, in accordance with this requirement.

a) the engine pylon leading edge;
b) the wing leading edge / forward spar, inboard of Wing Station 91.

(2) Birdstrike Damage Protection - Citation 560 Excel Serial No. 560-5001 and onwards.

To comply with JAR 25.631, the following areas must be provided with adequate protection to ensure continued safe flight and landing of the aeroplane, following an impact with a 4 lb bird, in accordance with this requirement.

a) the wing leading edge / forward spar, inboard of Wing Station 91.
b) the nose located oxygen bottle.
c) the forward pressure bulkhead.
d) the leading edge of the vertical fin.

4.1.4 Hydro-mechanical Systems

(1) Protection of equipment on the landing gear and in the wheel wells - Citation 560 Encore Serial No. 560-0539 and onwards and Citation 560

Excel Serial No. 560-5001 and onwards.

To comply with JAR 25.729(f), the brake hoses must be routed, or otherwise protected, such that braking of the main wheels is not lost due to possible impact from a failed tyre.

(2) Protection of the Nose Wheel Steering During Ground Manoeuvring using External Means - Citation 560 Encore Serial No. 560-0539 and onwards and Citation 560 Excel Serial No. 560-5001 and onwards.

To comply with JAR 25X745(d), the design of the attachment(s) for towing the aircraft on the ground must be such as to preclude damage to the steering system, in accordance with this requirement

(3) Take-Off Configuration Warning System Parking Brake - Citation 560 Excel Serial No. 560-5001 and onwards.

To comply with JAR 25.703(a)(3) the take-off configuration warning system must include the parking brake, in accordance with this requirement.

(4) Main Cabin Door - Citation 560 Excel Serial No. 560-5001 and onwards.

To comply with JAR 25.783, CAA/C560XL/04 - NPA 25D-218 Rev 2 & JAR25.809 (c) the main cabin door should be appropriately modified to take account of the following :-

a) the means of opening, for the main cabin door, must be simple and obvious and must be arranged and marked so that it can be readily located and operated even in darkness.

b) The door locking means must be such, that in the event of disconnection of any latching element from its operating mechanism, the latch would be appropriately restrained in the latched condition by the locking feature.

c) The door visual indications, which are provided to show the position of the latches and locks, must provide unambiguous verification of the position for the latches.

d) No single failure in the operating linkage will allow the vent panel to close until the door is properly latched and locked.

e) Manual override of the automatic control of the vent, which permits the vent to be closed without the door being locked, is to be inhibited.

4.1.5 Electrical Systems

(1) Engine Earth Mounting - Citation 560 Encore Serial No. 560-0539 and onwards up to and including Serial No. 560-5000.

To comply with JAR 25.1309, an adequate number of earthing points for the electrical accessories installed on the engine are required to be provided.-

(2) APU Bonding - Citation 560 Excel Serial No. 560-5001 to 560-5098 fitted with the optional APU.

To comply with JAR 25A901(b)(4), an adequate number of earthing points for the APU are required to be provided.-

(3) Emergency Standby Power- - Citation 560 Excel Serial No. 560-5001 and onwards.

To comply with JAR 25.1351(d) & ACJ 25.1352(d)(6.1), an appropriate pilot recognition time (assumed to be 5 minutes if the aircraft failure warning system has clear and unambiguous attention-getting qualities) must be used to enable appropriate drills to be completed before having to select emergency battery power. The power source should also have an endurance of at least 60 minutes, at least 30 minutes of which is available under IMC.

4.1.6 Avionic Systems

None.

4.1.7 Powerplant Installation/Fuel Systems

(1) Audible fire warning - Citation 560 Encore Serial No. 560-0539 and onwards and Citation 560 Excel Serial No. 560-5001 and onwards.

To comply with JAR 25.1305(a)(7), an audible powerplant fire warning is required in addition to a visual warning.

(2) Fuel Filler Cap Lanyard - Citation 560 Encore Serial No. 560-0539 and onwards up to and including Serial No. 560-5000.

To comply with JAR 25.954, the fuel filler cap lanyard must present no hazard to the aircraft in the event of a lightning strike inducing direct lightning current in the lanyard.

(3) APU Fuel Shut-Off Valve Indication - Citation 560 Excel Serial No. 560-5001 onwards fitted with the optional APU.

To comply with JAR 25A1141(f)(2) a valve position indicator, for the APU fuel shut-off valve, is required in order to show that it has attained its selected position.

4.1.8 Cabin Safety/Environmental Control Systems

(1) Cabin Seat Materials - Citation 560 V Citation 560 Ultra and Citation Encore aircraft up to and including Serial No. 560-5000.

For compliance with Airworthiness Notice No. 59, cabin seats which meet the fire blocking requirements of FAR 25.853 with Appendix F Part II at Amendment 25-59 are required for aircraft certificated in the Transport Category (Passenger).

(2) Toilet Compartment Ash Tray Citation 560 V Citation 560 Ultra and Citation Encore aircraft up to and including Serial No. 560-5000.

For compliance with Airworthiness Notice No. 83, an ash tray must be provided in the toilet compartment, preferably adjacent to the 'No Smoking' placard.

(3) Bleed Air System Wing Anti-Ice Overwing Ducts - Citation 560 Encore Serial No. 560-0539 and onwards and Citation 560 Excel Serial No. 560-5001 and onwards.

To comply with JAR 25.1438, the wing anti-ice overwing ducts must be designed and installed as to comply with JAR 25.1309.

(4) Placards - Citation 560 Excel Serial No. 560-5001 and onwards.

To comply with the requirements of JAR25.791 (d), 25.853(e), JAR25.1541, JAR25.1561 (b) and Airworthiness Notice 83 the following placards are to be provided:-

a) No Smoking placards are to be provided both inside and outside of lavatory compartments.

b) Suitable placarding, such that occupants in the main cabin can easily locate the fire extinguisher.

c) Adequate contrast of the passenger information placard located on the passenger windows is to be provided. This placard provides information relating to passenger seat.

(5) Rear Baggage Stowage - Citation 560 Excel Serial No. 560-5001 and onwards.

To comply with JAR 25. 857(b), there must be a separate approved smoke detector or fire detector system in the lavatory compartment baggage stowage, so as to comply with JAR 25. 857(b).

(6) Emergency Landing Dynamic Conditions - Citation 560 Excel Serial No. 560-5001 and onwards.

Cabin interior configurations are required to demonstrate compliance with JAR25.785 (b), JAR25.562 (c) and CAA Special Conditions CAA/C560XL/03A Personal Injury Criteria for Dynamic Testing of Side Facing Sofas. (Single Place), CAA/C560XL/03B Personal Injury Criteria for Dynamic Testing of Side Facing Divan (Two Place), as appropriate.

4.1.9 Flight Manual

A CAA approved Flight Manual must be provided which incorporates all the data, limitations and procedures required by the CAA.

4.2 CAA Design Requirements For Certificate Of Airworthiness

4.2.1 Airworthiness Notices

To be reviewed when issuing an individual aircraft Certificate of Airworthiness.

4.2.2 Airworthiness Directives

To be reviewed when issuing an individual aircraft Certificate of Airworthiness.

Any installed equipment for which the Air Navigation Order requires approval must be approved by the CAA.

4.3 Environmental Requirements

Compliance with the noise certification requirements of BCAR Section N Issue 5, equivalent to ICAO Annex 16, Chapter 6.

4.4 Design Requirements Associated With Operational Approvals

4.4.1 Equipment Required by UK Air Navigation Order (or JAR OPS 1)

To be reviewed when issuing an individual aircraft Certificate of Airworthiness.

5. Compliance With The Basis Of Validation

5.1 Compliance With The Validation Basis For The Aircraft

Cessna have provided modifications in order to satisfy the UK Additional Requirements for Import, as identified in the Cessna UK Build Standard Document 560XL-00-011 Revision D, with the exception of those items identified in Section 6 of this AAN.

The Pratt and Whitney Canada P&WC PW545A engines were CAA validated, reference letter 9/80/PW500/C01/2-A dated 13 October 1998.

The optional Honeywell RE100 APU was CAA validated, reference letter 9/80/RE100/C01/1-A dated 23 November 2000.

Details of the CAA investigation and compliance are recorded in the CAA files reference 9/33/3544/A27332.

5.2 Compliance With Design Requirements For Certificate Of Airworthiness

To be reviewed when issuing an individual aircraft Certificate of Airworthiness.

5.3 Compliance with Environmental Requirements

The noise substantiation of the aircraft has been reviewed and compliance with BCAR Section N confirmed. CAA Noise Type Certificate No. 125 Issue 4 was issued on 30 March 2001.

5.4 Compliance with Design Requirements Associated With Operational Approvals

To be reviewed when issuing an individual aircraft Certificate of Airworthiness.

Compliance has been established with the design requirements which are a pre-requisite to approval of the associated operation. This finding of compliance with the design requirements does not signify that any operational approval has been granted.

5.5 Required (Amendments To) Manuals And Other Documents Including Mandatory Placards

a. Flight Manual - Citation 560 Excel UK Flight Manual 56XUK-00 dated July 2001, or later approved amendments, plus Supplements as specified in CAA letter 9/24/1/26/35 dated 30 July 2001.

It should be noted that the CAA approved Flight Manual was based on the build standard of aircraft 560-5167.

b. Placards - Refer to ARI 4.1.8 (4) above for details on those additional placards required to satisfy the UK ARIs.

c Electrical Load Analysis Compliance Report EL-XL-200 - Appendix H 560XL UK CAA Configuration.

Where the manufacturer has supplied Flight Manual Supplements for the various items of optional equipment, the appropriate Supplement(s) shall be included when the equipment is installed, and it shall be verified that the Supplement(s) have been approved by the CAA.

6. <u>Conditions Affecting This Approval</u>

Certain operational approvals require that the aircraft and/or systems comply with specified design requirements. Where this AAN records compliance with those design requirements this shall not be taken as acceptance by the CAA of compliance with the relevant operational requirements, for which further justification may be required.

The following periods of waiver have been accepted, for the embodiment of modifications to comply with the referenced ARIs.

ARI	Description	Period of Waiver
4.1.4 (3) (a)(b)(c)(d)(e)	<u>Main Cabin Door</u> Means of opening Door locking means Door visual indications Vent panel operating linkage Manual override of the automatic control of the vent	7 months.
4.1.7 (3)	<u>Powerplant Installation/Fuel Systems</u> APU fuel shut-off valve indication	6 months.
4.1.8 (6)	<u>Cabin Safety/Environmental Control Systems</u>	6 months.

Emergency landing dynamic conditions

Temporary non-compliance with these ARI(s) has been accepted by the CAA. Consequently, the granting of a UK Certificate of Airworthiness for a Cessna 560 Excel shall cease to be in force in accordance with the preceding dates, unless appropriate modifications have been installed to the satisfaction of the CAA.

7. Continued Airworthiness

Instructions for Continued Airworthiness are specified within the Aircraft Maintenance Manual, including the Airworthiness Limitations specified with Chapter 4 and the operators approved maintenance programme.

8. Survey

No CAA survey required.

9. Issue of Certificate of Airworthiness

To be reviewed when issuing an individual aircraft Certificate of Airworthiness.

10. Approval

Subject to the conditions under Section 6 above, UK Type Certification of the Cessna Citation 560XL is granted on the basis of compliance of the Type Design with the applicable requirements of Federal Aviation Administration, the Exporting Authority, and the UK Additional Requirements for Import for the type.

Certification of individual Cessna Citation 560XL aircraft for the issue of a UK Certificate of Airworthiness will require determination that any design changes comply with the above requirements and that the aircraft complies with the UK Additional Requirements for Certificate of Airworthiness issue. UK operational approval will require compliance with the UK Additional Requirements for Operational Approval.

P Moule
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For the Civil Aviation Authority

Date 30 July 2001