

Advisory Circular

AC 21.13(0)

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AUSTRALIAN-DESIGNED AIRCRAFT – TYPE CERTIFICATION

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Advisory Circulars (ACs) are advisory only. ACs provide recommendations and guidance to illustrate a method, or several methods, not necessarily being the only method by which legislative requirements may be met. They also provide a means of illustrating the meaning of certain requirements by offering interpretive and explanatory guidance. ACs should always be read in conjunction with the referenced regulations.

1. REFERENCES

Civil Aviation Safety Regulations (CASRs) Parts 21 to 35.

Note: CASRs referred to above are currently enacted as CAR 1998.

2. PURPOSE

This Advisory Circular (AC) provides guidance and information for applicants applying for Type Certificates (TCs) issued for aircraft designed in Australia under CASR Part 21 “Certification and Airworthiness Requirements for Aircraft and Parts”. This AC describes the requirements and procedures involved in the aircraft type certification process, and the responsibilities of the industry applicants, authorised engineering representatives and involved CASA staff.

3. PURPOSE

This is the first AC to be written on this subject.

4. BACKGROUND

The introduction of CASRs Parts 21-35 now aligns the Authority’s approach to type certification with typical international aeronautical practice, particularly that of the U.S. Federal Aviation Administration (FAA), as far as practicable. Accordingly, much of the information in this AC reflects the overall policies and procedures contained in the relevant FAA Orders, Notices and ACs.

5. CERTIFICATION PHILOSOPHY

5.1 Aircraft type certification is the process of the evaluation and approval of aircraft type design data against designated design standards, to culminate in the issue of a TC. A TC is a prerequisite for the issue of a Certificate of Airworthiness (CoA) for an individual aircraft, (see paragraphs 5.3 and 5.4).

5.2 Certification of an aircraft type involves:

- (a) prescribing appropriate design standards and requirements;
- (b) ensuring the product design is proven to meet the design standards, through competent and adequate ground tests, engineering analysis, and flight tests;
- (c) checking that the test articles when manufactured conform to the design requirements;
- (d) ensuring that the flight manual and associated operating aspects are satisfactory;
- (e) acceptance of the maintenance manual and approval of the Airworthiness Limitations Section of the maintenance manual (if applicable) ; and
- (f) ensuring that satisfactory arrangements are in place for continuing airworthiness control, defect reporting, and supply of service documents, (see CASR 21.50(2)).

5.3 This AC addresses type certification of Australian designed aircraft for the issue of TCs to enable CoAs to be issued in the following categories:

- Transport
- Normal
- Utility
- Acrobatic
- Commuter
- Manned free balloons
- Special class

5.4 For details on type certification of other classes of Australian designed aircraft and products, see the following ACs:

- AC 21.6 “Restricted Category Aircraft – Certification”
- AC 21.7 “Primary Category Aircraft – Certification”
- AC 21.8 “Intermediate Category Aircraft – Certification”
- AC 21.11 “Amateur-Built (ABAA) Aircraft – Certification”
- AC 21.18 “Australian Designed Engines – Type Certification”
- AC 21.19 “Australian Designed Propellers – Type Certification”

5.5 A flow chart of the type certification process is presented in Appendix 1.

6. DEFINITIONS

A ***Type Certificate***, in relation to an aircraft, includes the type design, the operating limitations, the Type Certificate Data Sheet (TCDS), the applicable airworthiness standards for which the certificate records compliance and any other conditions or limitations prescribed by CASA.

A ***Provisional Type Certificate*** may be issued when all requirements for a TC are not complete but the applicant can show compliance with CASR 21.81 for a Class I, or CASR 21.83 for a Class II, Provisional TC (PTC).

An ***amended Type Certificate*** may be issued when a change to the type design is not so extensive as to require a new TC through CASR 21.19, but is classified as “major”, as defined by CASR 21.93. Only a TC holder may apply for a TC amendment.

A ***Supplemental Type Certificate (STC)*** may be issued for a major change in a type design when the change is not so extensive as to require a new TC, as required by CASR 21.19. Minor changes do not require STCs. Minor and major changes are classified in CASR 21.93.

Note: STCs are not addressed further in this AC. For full details on STC application and issue procedures, see AC 21.15, “Supplemental Type Certificates – Certification”.

A ***Production Certificate (PC)*** is an authorisation by the Authority for a manufacturer to manufacture a product in compliance with the CASRs. A PC may be issued to either the holder of a TC, a STC, or to a licensee of a TC holder, who meets the requirements of CASRs 21.135, 21.139, and 21.143.

A **product** is an aircraft, an aircraft engine, or propeller. In regard to export airworthiness approvals, “product” is further divided into International Civil Aviation Organisation (ICAO) Class I, Class II, and Class III products, and includes components and parts of aircraft, of aircraft engines, and of propellers; also parts, materials, and appliances, approved under the Australian Technical Standard Order Authorisation (ATSOA) system. TCs are only issued for aircraft, aircraft engines and propellers.

Note: Engine and propeller type certification is not addressed further in this AC. For full details, refer to advisory circulars AC 21.18 “Australian Designed Engines – Type Certification”, and AC 21.19 “Australian Designed Propellers – Type Certification”.

An **article** is a material, a component or an assembly used in a part as specified in the approved design data.

A **part** is an item to be installed on a type-certificated aircraft, aircraft engine, or propeller. Such an item may comprise a component, an assembly, material, as well as proprietary parts.

An **appliance** is any instrument, mechanism, equipment, part, apparatus, appurtenance, or accessory, including communication equipment, that is used or intended to be used in operating or controlling an aircraft in flight, as installed in or attached to the aircraft, and is not a part of an airframe, engine or propeller.

A **manufacturer** is the holder or licensee of a TC producing duplicate products in accordance with CASR Part 21 Subpart F or Subpart G.

A **supplier** is any person who furnishes articles or services related to the manufacture of type-certificated products.

7. RELEVANT CASA INVOLVEMENT

7.1 The CASA Central Office is located in Canberra, with the Certification Standards Branch of the Authority’s Aviation Safety Standards Division (ASSD) being responsible for managing all major certification projects. Engineering Support Groups (ESGs), which interface with industry are located in Sydney, Melbourne and Brisbane. The ESGs are the first point of contact for Australian aircraft certification projects. A list of these offices with contact details is given in AC 11.1 “Advisory Circulars – Guidelines”.

7.2 The more detailed relationships in regard to Australian product certification are as follows:

- (a) certification policy, project management, and broad control of certification programs, is the responsibility of the Head of Certification Standards ASSD through designated Project Managers;
- (b) the day-to-day oversight of major Australian product certification projects is undertaken by designated ESG project leaders, working under an ASSD Project Manager;
- (c) additional project support by airworthiness inspectors (AWIs) from the relevant CASA Offices spread around Australia, is utilised on a day-to-day basis;
- (d) technical specialist support is provided by the specialist areas within the ASSD.

8. INITIAL APPLICATION PROCEDURE

8.1 Who may apply

8.1.1 As stated in CASR 21.13 “Any person is eligible to apply to CASA for a Type Certificate or Type Acceptance Certificate”. Thus the applicant for a TC is the person or duly elected officer of an organisation who signs the initial application form. This may be the project sponsor, designer or other industry representative of the project. The initial response from the Authority will invariably be to this applicant, however subsequent dealings may well be with other persons.

8.1.2 An applicant need not be an Australian citizen. However, all certification policies and procedures applied to the project will be those of the Authority as defined in the CASRs, subsidiary legislation, airworthiness control instructions, publications, ACs, etc. The certification activity is normally confined to Australian territory.

8.1.3 The project will be greatly facilitated if the applicant holds a Certificate of Approval under regulation 30 of CAR 1988 as a Approved Design Organisation for the coordination of design activities, or contracts a suitable authorised person or organisation.

8.2 When to apply

8.2.1 The earlier an applicant makes contact (not necessarily making the formal application) with the Authority, the better the chance of subsequent proper project progress, with the least possible disruption and certification costs. Less experienced applicants will greatly benefit from the advice that, at that stage of the certification process, may be provided by CASA airworthiness officers free of charge. An aircraft should be designed to a standard, and not altered in a random fashion to meet the standard after the event. This is not to suggest that the standard overrides the design specification, in that the standard is the minimum acceptable for certification. Furthermore, compliance with the applicable standard does not guarantee a successful product.

8.2.2 Experience has shown that some persons new to the design side of the industry feel that commercial confidentiality is paramount. In order to gain a perceived edge on the competition, or to achieve a marketing coup, they develop aircraft types in secret before making proper contact with the Authority. This can prove disastrous, as the impact of certification standards and procedures may be realised too late, and development may have to start again, perhaps from scratch, with associated financial losses. It should be understood that CASA officers will maintain confidentiality as required, and a project may be designated commercial-in-confidence from the outset if that is the wish of the applicant.

8.2.3 Applicants must be aware of the impact of the time limits for the validity of the application, and hence the agreed certification basis, on the overall timing of their project (CASR 21.17(3) refers). Specifically, an application for type certification of a transport category aircraft is effective for five years, from the date that the formal application is made by lodgement of the application form and data as described below. For any other type certification, the application is effective for three years. However the period may be extended if an applicant shows, before the application period lapses, that the aircraft requires a longer period of time for design, development and testing, and the period extension is approved by the Authority.

8.2.4 Thus, there may be advantages for the applicant in making early contact with the Authority as discussed in paragraph 8.2.1, but not formally lodging the application until the optimum time presents itself.

8.2.5 Timing of the application is also critical in regard to overseas acceptance of an Australian TC. The Australian design standards are tied to overseas design standards; however, the same time limits generally apply overseas. Therefore, the latest date at which an application can be made for the acceptance of an Australian TC, in say the US, will be five years (in the case of a Transport category aircraft) or three years in the case of any other type certification, after the initial application was lodged in Australia. An application lodged after this time risks being ruled ineligible unless it complies with later amendments to the design standard. Applicants are advised to confirm these time limits with the overseas Authority concerned, if there is any likelihood of seeking offshore validation of the Australian TC.

8.3 Where to apply

Initial contact can be with the nearest CASA Office. The Authority will determine which ESG will cover the type certification project involved, and advise the applicant. The formal application should then be lodged with that ESG.

8.4 Documentary requirements

8.4.1 Application is made on CASA Form No 733, “Type or Supplemental Type Certificate – Application”. A copy of this form may be obtained at CASA Offices.

Note: The effectivity period discussed in paragraph 8.2.3 commences from the date applied to the signature block.

8.4.2 The application must be accompanied by a three-view drawing of the aircraft, and preliminary, basic data. This should include, but not be limited to:

- (a) projected Maximum Take-off Weight (MTOW);
- (b) projected speed range;
- (c) engine type and number;
- (d) type of structure (e.g all composite; welded tube and fabric; welded tube and conventional riveted alloy; monocoque alloy etc);
- (e) proposed number of occupants and seating arrangements; and
- (f) as much detail as possible on any unconventional design features (e.g. canard surfaces, vee, tee, or boom tail surfaces, ducted propeller, unconventional control system, unconventional structural methods etc.).

Note 1: The three-view drawing should be to scale, with major dimensions applied in metric units.

Note 2: The Authority will not be in a position to provide advice on the next steps to be taken, or to register the project unless the above data is supplied in the first instance.

8.4.3 The next step will be for the Authority to issue a project number and provide the applicant with the name of the ASSD Project Manager. An interim written response acknowledging the application will be made. The interim response will address:

- (a) acknowledgment of the application;
- (b) name and contact numbers for the ASSD Project Manager;
- (c) the allocated project number and title; and
- (d) proposed arrangements for the first formal meeting.

8.4.4 History has shown that attempting to develop a new aircraft and a new powerplant simultaneously can cause time-consuming and costly difficulties. Applicants should ensure that the status of any non-certificated powerplant is clearly understood.

9. INITIAL PROGRAM PROCEDURES

9.1 The familiarisation meeting

9.1.1 This meeting may be held before the formal application process as described in Section 8 is carried out, and indeed, there may be advantages in such timing.

9.1.2 The venue of the meeting is not rigidly fixed. It is normally at the relevant ESG Office, but may be at the applicant's site if there are perceived advantages in this.

9.1.3 The following persons will attend the meeting:

- (a) the ASSD Project Manager (Chair);
- (b) the applicant with his/her representatives;
- (c) the ESG project leader; and
- (d) others as appropriate.

9.1.4 The ASSD Project Manager will ensure an agenda has been prepared and received by all attendees before the meeting.

9.1.5 The purposes of the familiarisation meeting will be to:

- (a) ensure that the Authority understands the needs of the applicant;
- (b) explain the type certification process and the Authority's expectations to the applicant in detail;
- (c) establish a partnership with the applicant, and develop mutual understanding of the type certification process as it applies to the applicant's design;
- (d) ensure the applicant understands the privileges conferred upon, and ongoing responsibilities of, a TC holder;
- (e) air any potential issues, in order to minimise any surprises further along in the process;
- (f) discuss and agree confidentiality arrangements;
- (g) agree on program timeframes;
- (h) explain CASA costing philosophy and details to the applicant; and
- (i) enable the applicant to identify a focal point and lines of communication to the CASA project team.

9.2 The certification program plan

The Certification Program Plan (CPP) defines the identified essential requirements for Authority involvement in the type certification program. The ASSD Project Manager develops the CPP for coordination of CASA activities.

9.3 The Certification Action Plan

The applicant is to develop a Certification Action Plan (CAP) to be presented to the Authority at or before the preliminary TCB meeting. The ASSD Project Manager will identify any Authority involvement to be included in that plan.

10. COSTING

10.1 The regulatory certification of aircraft is a relatively costly affair, but it is important for all to realise that the major proportion of costs would be required, irrespective of Authority oversight and issue of a TC, as:

- (a) proper configuration management systems are required of all technically competent design/manufacturing organisations if the relevant management values the principles of accountability and public safety;
- (b) there would be no possibility of export sales unless the manufacturer can provide to relevant National Airworthiness Authorities (NAAs) what is expected for Australian certification in regard to data, proof of compliance etc. In fact, experience has shown that some NAAs require more information (with attendant higher costs) than would have been required in Australia.

10.2 The relevant costs of certification may be broadly grouped as follows:

- (a) costs irrespective of CASA cost recovery:
 - (i) test specimens/samples/coupons;
 - (ii) drawings;
 - (iii) specifications;
 - (iv) prototype build;
 - (v) aircraft/component/sub-component ground tests;
 - (vi) flight tests;
 - (vii) test report compilation;
 - (viii) analysis report compilation;
 - (ix) compilation of compliance summary;
 - (x) compilation of any type record;
 - (xi) fulfilling further overseas regulatory authority requirements if export is involved; and
 - (xii) requested liaison with foreign authorities.
- (b) costs paid to the Authority attributable to cost recovery policy:
 - (i) any technical assistance requested by the applicant;
 - (ii) witnessing of specific certification tests;
 - (iii) data assessment and approval;
 - (iv) conformity inspections;
 - (v) certification ground inspection; and
 - (vi) certification flight review.

Note 1: The time spent by CASA personnel, both ASSD and ESG, in providing initial advice to the applicant, setting the certification basis, and preparing cost estimates, will not be charged, but that the hourly flat rate for CASA staff in assessing data, checking compliance, witnessing certification tests and resolving problems, up to the point of completion of the program, must be charged. Any research by the Authority or training of CASA officers to progress the application will not be charged to the applicant.

Note 2: Production/quality control aspects need to be well underway before TC issue. Costs are also associated with CASA involvement with this, and although not certification costs, are amounts which may need to be charged to the applicant. These are also reflected in the Schedule of Fees and Charges.

Note 3: The cost estimate is greatly influenced by the capabilities and experience of the applicant. Applicants holding design organisation approval under CASR Part 146 (currently regulation 30 of CAR 1988) could expect that CASA involvement and hence cost-recovery will be significantly less than for an inexperienced applicant.

10.3 Section 97 of the Civil Aviation Act allows prescribed fees to be payable to the Authority in advance of work to be done. In the case of issue of TCs, an hourly fee specified in the CASA Schedule of Fees is charged. An estimate, payment and reconciliation procedure is followed:

- (a) the ESG which receives the application, prepares an estimate based on experience and the specific tasks to be undertaken (including an ASSD component if any). General eligibility, timeframe and operational role aspects are discussed. The estimate is based on time estimates and travel times as applicable;
- (b) the applicant pays the estimated fee. For major TC projects, the applicant may be able to negotiate an initial payment, and progressive payments, with the ESG;
- (c) actual man hours expended are recorded as the task is undertaken;
- (d) a reconciliation will be made just before the TC is issued. If an overestimate has been made, a refund will be paid to the applicant. If underestimated, a final payment from the applicant will be required.

11. THE PRELIMINARY TYPE CERTIFICATION BOARD MEETING

11.1 A Type Certification Board (TCB) is established for all aircraft projects in which complete type certification is involved, and for projects involving significant changes to the type design.

11.2 The main tasks of the TCB are to:

- (a) clarify the initial issues raised by the applicant and the Authority with regard to the certification project;
- (b) resolve significant problems as the project progresses; and
- (c) oversee the schedule for the overall accomplishment of the type certification program.

11.3 The TCB comprises:

- (a) the ASSD Project Manager, as Chairperson;
- (b) the ESG project leader for the relevant CASA Office;
- (c) the ESG manager;
- (d) ASSD technical specialists and the CASA Test Pilot on an as-required basis; and
- (e) the applicant and his/her nominated engineering representatives.

11.4 The Chairperson convenes the TCB as necessary, and notifies the appropriate representatives as to the time, date and location of the meeting. The stage meetings are:

- (a) the preliminary TCB meeting;
- (b) the final TCB meeting; and
- (c) any extraordinary TCB meetings.

Note 1: The preliminary and final meetings are essentially standards setting and compliance method determination meetings, and hence are not cost recoverable.

Note 2: Extraordinary meetings requested by the applicant for assistance are cost recoverable.

11.5 The purpose of the preliminary TCB meeting is to:

- (a) collect data about the technical aspects of the project
- (b) review in detail the certification basis as proposed by the applicant, identifying novel or unique design features, materials or processes (see Section 12);
- (c) discuss proposed special conditions (see Section 13);
- (d) review any proposed equivalent safety determinations (ESDs) (see paragraph 16.12);
- (e) identify information necessary to start developing the CPP (see paragraph 9.2);
- (f) establish the schedule and major milestones for the certification program;
- (g) set the certification basis, or prepare a timeframe for certification basis issue;
- (h) make arrangements for the initial publication of the Issues Book (see paragraph 14.3); and
- (i) review the Certification Action Plan, including the proposed means of compliance (see paragraph 9.3).

11.6 An agenda for the meeting will be circulated prior to the meeting, minutes will be taken, with decisions/actions being properly documented.

12. THE CERTIFICATION BASIS

12.1 The certification basis for any type certificate project consists of the basic design standard (e.g. CASR 23.1, CAO 101.55 etc.), together with any special conditions associated with the individual design. The certification basis also makes explicit reference to design standard issue dates and amendment states, and any ESDs which may be agreed prior to program commencement.

12.2 A sample certification basis is given below.

“The certification basis for the Acme Fastcommuter Mark 1 aircraft shall be Civil Aviation Safety Regulation (CASR) 23.1 (a), embodying Federal Aviation Regulation (FAR) Part 23, up to and including Amendment 34 dated 14th September 1987, and Special Conditions/AF-1 to 12”.

12.3 Once the certification basis has been set and agreed with by the applicant, (which may be during the preliminary TCB meeting, or soon thereafter), then it is valid until the effectivity period as discussed in paragraph 8.2.3 above expires. Unless the Authority has agreed to an extension of this period, then the certification basis may be required to

incorporate a design standard with a later amendment state that dates three (or five) years earlier than the date of resetting the certification basis. On the other hand, nothing precludes an applicant revising the certification basis during the course of his or her project to incorporate later design standards.

12.4 The following example illustrates the requirement in paragraph 12.3:

- (a) an applicant for a small aircraft TC submits Form No 733 signed on 16th October 1998. Thus the effectivity period expires on 15 October 2001;
- (b) the certification basis is set and formally notified to the applicant two months after application (16 December 1998). The certification basis is valid until 15 October 2001;
- (c) after a lengthy period of inactivity, on 6 May 2002 the applicant requests that the certification program should recommence;
- (d) the Authority may now incorporate any applicable design standard amendments introduced between the period 16 December 1998 and 6 May 1999 into a revised certification basis.

12.5 The following categories of Australian-designed aircraft are required to be type-certificated, but no formal basic design standard has been prescribed in Australian legislation:

- (a) Primary (see AC 21.7);
- (b) Intermediate (see AC 21.8);
- (c) Special Class (eg airships, tiltrotor); and
- (d) Restricted (see AC 21.6).

12.6 For these categories, the certification basis is proposed by the applicant. Detailed negotiations are then undertaken by the applicant with the Authority; the latter being represented by ASSD and ESG officers. When agreement on the certification basis is reached, the inherent design standards will then be the subject of a Notice of Proposed Rulemaking (NPRM) process, which will detail the proposed design standards and invite public comment. After the disposition of any comments by the Authority, and after necessary evaluations and revision, the design standards will be published and included in the Manual of Accepted Standards.

12.7 The standards are now promulgated as follows:

- (a) normal aeroplanes – CASR Part 23;
- (b) utility aeroplanes – CASR Part 23;
- (c) acrobatic aeroplanes – CASR Part 23;

Note: CASR Part 23 embodies FAR Part 23, Joint Aviation Requirement (European) (JAR)-23 and JAR-VLA. The former two codes are conventional small aeroplane standards (MTOW not exceeding 5700 kilograms). JAR-VLA is a standard for a smaller, minimum capability aircraft in the normal category, not exceeding 750 kg MTOW, and having restrictions on the purposes for which the aircraft may be used.

- (d) commuter aeroplanes – CASR Part 23. Additional items for aircraft with MTOWs up to 8618 kilograms are contained in FAR Part 23 and JAR Part 23;
- (e) transport aeroplanes – CASR Part 25. CASR Part 25 embodies FAR Part 25 and JAR-25;

- (f) normal rotorcraft – CASR Part 27. CASR Part 27 embodies FAR Part 27 and JAR Part 27;
- (g) transport rotorcraft – CASR Part 29. CASR Part 29 embodies FAR Part 29 and JAR Part 29;
- (h) special class aircraft – CASR 21.17 (1);
- (i) restricted aircraft – CASR 21.17 (1), with cross-reference to 21.25;
- (j) primary aircraft – CASR Part 26;
- (k) intermediate aircraft – CASR Part 26;
- (l) gliders and powered sailplanes – CASR Part 22. CASR Part 22 embodies various overseas design standards, such as JAR-22; (noting that gliders and powered sailplanes are categorised as normal, utility and/or acrobatic);
- (m) manned free balloons – CASR Part 31. Embodies CAO Section 101.54;
- (n) amateur-built category aeroplanes – CAO 101.28;
- (o) aeroplanes with a maximum weight not exceeding 450 kilograms – CAO 101.55.

12.8 For further information on category criteria and limitations, see AC 21.1, “Aircraft Airworthiness Certification Categories and Designations Explained”.

12.9 Applicants for certification of aircraft products are expected to hold relevant copies of the design standards that constitute the certification basis for the applicant’s project, such as FARs, JARs, and/or relevant CAOs. These are not supplied by the Authority. The publications can be obtained from:

JARs – Westward Digital Ltd
37 Windsor Street
Cheltenham GL52 2DG
England

FARs – Superintendent of Documents
Attn. New Orders
PO Box 37194
Pittsburgh PA 15250-7954
U.S.A.

CAOs – Airservices Australia Publications Centre
PO Box 1986
Carlton South VIC 3053

Note: Some aviation bookshops/pilots shops in Australia stock compilation copies of the FARs, JARs, CARs and CAOs.

12.10 When establishing compliance with requirements specified in the FARs, it will be to the applicant’s advantage to refer to the large volume of material available in relevant Advisory Circulars published by the FAA. Such Advisory Circulars are usually designated by two digit groups, the first referring to the applicable FAR (e.g. AC 23-2 Flammability Tests, for aircraft designed to FAR 23). These documents are very useful in that they provide an acceptable means of demonstrating compliance with a requirement.

13. SPECIAL CONDITIONS

13.1 Special conditions may be raised if the Authority considers that the nominated basic design standards do not provide an adequate safety standard for the product because of novel or unusual design features. (CASR 21.16 “Special standards and other conditions on type certificates” refers.)

13.2 Special conditions are unique to the specific certification program for which they are issued. Special conditions will not be used as a particular method or technique to show compliance with an established rule.

13.3 Special conditions are formulated with the full participation of the applicant. An Issue Paper (described in Section 14) will summarise the relevant design features and regulatory inadequacies, and propose the wording of the special condition.

13.4 Any special conditions imposed and satisfied during a type certification program must eventually be reflected in the TC, or annexed to the TC (usually in the TCDS).

14. ISSUE PAPERS

14.1 General

14.1.1 Issue Papers provide a simple, structured means of accomplishing several necessary steps in the type certification process in that they provide a means for describing and tracking the resolution of significant type certification issues and problems throughout a program. Issue Papers provide an efficient means of assuring coordinated certification decisions and should replace other paperwork such as briefing papers, memoranda, and lengthy letters whenever possible. They are “living” documents in that the positions of the Authority and the applicant are entered into the documents in succession until resolution is gained.

14.1.2 An Issues Book is kept of the final stage of each Issue Paper, and is referred to in the Certification Summary Report.

14.1.3 Significant issues may not be identified or resolved at initial project familiarisation briefings, and may require negotiation between the Authority and the applicant.

14.1.4 The following items will normally be considered significant issues on major projects, requiring the development of Issue Papers:

- (a) Type certification basis – designates the applicable airworthiness standards, including special conditions as necessary, that must be met for type certification. This Issue Paper should provide the definitive justification for selection of the certification basis, including specific amendment levels. Included as an attachment will be a project checklist or, by document reference, the applicant’s own compliance checklist, if found acceptable, and provided the applicant agrees to provide the checklist early in the program with updates as the program progresses.
- (b) Determination of compliance – provides a statement of the CASA procedural requirements, including those that define the applicant’s responsibility for showing compliance.
- (c) Export requirements – cites, for those projects where it is clearly established that the applicant plans to export the product to a foreign country, the extent

of the Authority's findings of compliance with that country's airworthiness requirements on behalf of the foreign NAA.

- (d) Rulemaking actions required of the Authority – these include the issuance of special conditions pursuant to either CASR 21.16 or CASR 21.101(2)(b), as applicable.
- (e) Equivalent safety findings – proposed or made under the authority of CASR 21.16(1).
- (f) Unsafe situations that could preclude certification, as indirectly defined in CASR 21.16(2).
- (g) Application of later regulations – per CASR 21.17(3), not voluntarily agreed to by the applicant.
- (h) Areas of new technology or novel design that do not require special conditions, but may require the development of an acceptable means of compliance with existing regulations which would set a precedent.
- (i) Items requiring the utilisation of a special certification review team for resolution.
- (j) All other issues that become controversial or may otherwise require TCB action to resolve.

14.2 Issue Paper development

14.2.1 New Issue Papers may be proposed to the TCB at any time during the certification process prior to final type certification.

14.2.2 A sample Issue Paper can be provided by the Authority on request.

14.2.3 Draft Issue Papers will be developed by the project team members for each significant issue as early in the program as practicable.

14.2.4 Issue Papers are primarily intended to provide CASA and applicant management with an overview of significant issues, to provide:

- (a) a means of determining the status of these issues;
- (b) a post-certification summary statement on how significant issues were resolved; and
- (c) general reference on future projects that might encounter similar situations.

14.3 The Issues Book

Issue Papers passed through the preliminary TCB will be assembled and published in the form of an Issues Book by the ASSD Project Manager.

14.4 Ongoing Issue Paper control arrangements

14.4.1 The bulk of the type certification work will be accomplished through ongoing technical assessment activities by the project team members and other technical participants outside the framework of formal TCB meetings. Progress on all items is to be documented by formal entries in the official type certification project file. Progress on significant issues will also be indicated by updating existing Issue Papers, or if new significant issues are raised, by developing new Issue Papers. This will also involve applicant input.

14.4.2 If an impasse is reached between the applicant and the Authority, or between TCB members, the ASSD Project Manager shall resolve it after considering the views of all

affected parties. The resulting decision becomes the basis for the CASA position in the Issue Paper.

14.4.3 The Issue Paper’s conclusion shall result from TCB action. Most issues should be capable of resolution informally, by coordination of Issue Papers amongst the TCB members and the applicant, without a meeting.

15. DESIGN AND MANUFACTURING CONTROL

15.1 General

15.1.1 There are two methods under which approval for the manufacture of aircraft, aircraft engines and propellers can be achieved. For manufacture under a PC refer to AC 21.14 “Production Certificates”. For manufacture without a PC, refer to AC 21.20 “Production Under Type Certificate Only.”

15.1.2 The designer/intending manufacturer must start to develop a system of design control and manufacturing quality control procedures from the outset of the program. This will minimise the “backtracking” work that will waste time and effort for both the applicant and the Authority as final certification is neared, and manufacture and product support aspects are imminent.

15.1.3 Design staff may be nominated by the manufacturer and appointed by the Authority pursuant to CASR 21.31(1)(a) for design activities. The Instruments of Appointment (IoAs) issued by the Authority will authorise named individuals “whilst in the employ” of the manufacturer or applicant to approve data within limitations nominated on the IoA.

5.1.4 However, there is no objection in principle to design work being contracted out by the proposed manufacturer or applicant to another approved organisation or authorised person. In such cases, it is important that the manufacturer has nominated design procedures, suited to the product and the basic organisation, which the subcontractor must observe. This is arranged by the Authority nominating the manufacturer’s procedures on the IoA and noting that these apply when the subcontractor is “working under an arrangement” to the manufacturer.

15.1.5 Note that it is highly desirable for the two parties to be co-joined in this way. The applicant has the overall responsibility for the design and manufacture of the product. When working under the arrangement, the subcontractor must be acting “for and on behalf of” the applicant or manufacturer at the time. This is the only way in which the quality and continuing airworthiness aspects can be addressed. If a situation were allowed to exist where design and manufacture were divorced, it would be impossible, in many situations, to decide who is responsible for a given problem. This would be unacceptable to the Authority. Design consultants should note that any other design procedures and IoA will not be affected by this arrangement. The IoA and procedures relating to a given project will only affect work for that project.

15.2 Engineering Design

15.2.1 Approval of all engineering design data must be made by either a person holding an IoA under CASR 21.31(1)(a) or the Authority. The organisation may elect to hold an authorisation under regulation 30 of CAR 1988 as an Approved Design Organisation, especially for the coordination of all the design disciplines.

15.2.2 If design activities are to be wholly or partly contracted out by the applicant, then the procedures and the degree of monitoring or control will depend upon the scope of activities of the prime manufacturer relative to the subcontractor in each case. The subcontracting arrangements are to be such that the prime manufacturer retains the overall responsibility for the design and quality of the product. Note that design responsibility does not extend to components which have themselves been issued with a TC or ATSOA, or made under a PMA, nor to Class III products (as defined in CASR 21.321(2)(c)), in the name of another manufacturer. Notwithstanding the above, the subcontracting company is not absolved from any of its responsibilities under the Regulations.

15.2.3 Contracted design engineers must hold an appropriate IoA for the discipline. A contracted design organisation must hold an appropriate Certificate of Approval under CASR Part 146 (currently regulation 30 of CAR 1988) to supervise and coordinate the various disciplines, to certify for compliance with the airworthiness standards.

15.2.4 Documents which describe and control the manufacture of hardware and/or its performance, are to be approved, either under company procedures or as required by the CASRs. For example:

- (a) drawings;
- (b) drawing change notices;
- (c) engineering orders;
- (d) engineering concessions;
- (e) engineering notes;
- (f) service bulletins;
- (g) processes;
- (h) procedures;
- (i) computer hardware and software;
- (j) engineering change notices;
- (k) engineering reports;
- (l) test schedules.

15.2.5 Documents related to design activities but not requiring design approval are to be signed by responsible engineering staff. For example:

- (a) design advices;
- (b) applications for experimental certificates
- (c) manuals;
- (d) service letters (maintenance information).

15.2.6 With a view to production, there should be procedures devoted to the distribution and amendment of approved data. For further information see AC 21.14 “Production Certificates”.

15.2.7 Design data issued outside the manufacturer’s control is to be under cover of a field service document of some kind. This document is to list all of the hardware, special tools, data and actions required to incorporate the design, including logbook entries, weight and balance changes, and flight manual actions as appropriate. If any uncontrolled design data is to be issued outside the factory, for the purpose of obtaining quotations for example,

it must be clearly marked as “NOT APPROVED” or “UNCONTROLLED COPY – NOT TO BE USED FOR MANUFACTURE OR MAINTENANCE”.

15.2.8 The Design Manager/Chief Designer will not normally be considered sufficiently experienced for the purpose of CASR 21.31(1)(a) without having participated in the certification of several new products, either with the manufacturer or in some previous appointment. In such a case, the applicant may have to engage a suitable person or subcontract the work.

15.2.9 Problems may arise if the design team loses capability due to the retirement or resignation of senior staff. Should this situation arise the Authority must be advised.

15.2.10 Lists of current approved consultants are maintained in the ESGs.

15.3 The Type Design

15.3.1 The Type Design of an Australian-designed aircraft, aircraft engine or propeller, is defined in CASR 21.31(1), “Type Design – Meaning”. The basic aims of the Type Design are:

- (a) to define, at a fixed point in time, the type design status and configuration of the product;
- (b) to provide a detailed specification baseline against which any conformity audit can be performed, or any modifications safely developed;
- (c) to record the final design basis for product certification.

15.3.2 The Authority does not prescribe a rigid listing of those documents which it perceives to be the Type Design. However, for an aircraft designed, built and certificated to a design standard accepted by the Authority, the Type Design shall normally consist of, but not be limited to, the following:

- (a) a three-view general arrangement drawing of the aircraft to scale, with major dimensions applied in metric units;
- (b) a sealed list of drawings, consisting of general arrangement drawings, either:
 - (i) cross-referencing other drawings which then completely define the design of the aircraft; or
 - (ii) an independent listing of detailed drawings which completely define the design of the aircraft;
- (c) a detailed technical specification of the aircraft;
- (d) information on materials and processes used in the construction of the aircraft;
- (e) the final amended compliance summary, signed as complete by the company Chief Designer or equivalent, including the full certification basis;
- (f) the basic aerodynamic data used in the design;
- (g) the design assumptions and calculations;
- (h) a report of dimensions, materials and processes necessary to define structural strength;
- (i) a list of reserve factors for ultimate load conditions at all critical parts of the aircraft structure;
- (j) the complete aircraft weight and centre of gravity details;
- (k) copies of reports giving the particulars and results of airworthiness certification acceptance tests, for both ground and flight test phases, including

the completed Type Inspection Report (TIR), to substantiate compliance with the applicable requirements;

- (l) particulars of any variations from CASA requirements and/or the certification basis, as have been authorised with respect to the aircraft design, giving the reference number of the CASA written authority for the variations, e.g. equivalent safety determinations;
- (m) the equipment list;
- (n) copies of subsidiary TCs (e.g. TCs for engine(s) and propellers);
- (o) the flight manual as approved for type certification, including operating limitations and other information necessary for the safe operation of the aircraft, aircraft engine(s) and propeller(s) (as applicable);
- (p) the accepted maintenance manual or its equivalent, containing the approved airworthiness limitations (if applicable), with details of the manufacturer's recommended scheduled maintenance programs;
- (q) instructions for continuing airworthiness;
- (r) for primary and intermediate category aircraft – any special inspection and preventive maintenance program designed to be accomplished by an appropriately qualified pilot-owner.

15.3.3 Document control

Each design drawing should bear a descriptive title, drawing number and date of issue. An acceptable alterations system should be in place, (e.g. alterations to drawings should be made in accordance with the drawing amendment system so as to ensure amendment to design records). Immediately an alteration is made to a drawing, whether the alteration is permanent or temporary, the drawing should be identified with a new issue number and date. Where an alteration affects the interchangeability of an item in any way, a new part number should be issued so as to avoid confusion with the original item.

15.3.4 Availability of the Type Design

The Type Design data shall be held at a location agreed with the Authority. No part of the Type Design data may be destroyed without the Authority's written authorisation.

15.3.5 Surrender of the TC

In the case of a TC holder ceasing business, the Type Design must be transferred to a new TC holder, or surrendered to the Authority under the provisions of regulation 301 of CAR 1988; this latter action could lead to the grounding of the type involved.

15.4 Equipment list

An equipment list is not required for type certification but may be required for weight and balance control.

15.5 The Compliance Summary

15.5.1 The Compliance Summary should include compliance statements against all elements/paragraphs of the certification basis. The Summary should contain a statement of compliance, how compliance was demonstrated and reference to documents substantiating compliance.

15.5.2 The recommended form of this Summary is:

- (a) Column 1 – Requirement (Best photocopied and reduced from the basic document e.g. FAR 23)
- (b) Column 2 – Compliance statement:
 C – Complies
 S/R – Substitute requirement
 N/C – Does not comply
 N/A – Not applicable
 O – Open issue
- (c) Column 3 – Method of compliance
 e.g. calculations/analysis; lab/rig test; ground test; flight test; design drawing etc.
 A suggested code is:
 A – calculations/analysis
 T – test
 I – by inspection (e.g. cockpit lighting – See para 16.8.4)
 D – inherent in the design
 E/S – equivalent safety
 O/E – satisfactory operational experience (e.g. of a class of material or technique)
- (d) Column 4 – Document reference (By number and title)
- (e) Column 5 – Remarks

15.5.3 If the compliance statement for any item is a “N/C” or “O”, the remarks column should include a statement on the action being taken (e.g. reference to an Issue Paper, preparation of an equivalent safety submission, preparation of modifications etc.). The final issue of the Compliance Summary should contain no “open” items.

Note: The Compliance Summary is a “living” document, continuously amended throughout the duration of the program, and that it serves as the master reference for all activities aimed toward compliance.

16. DEVELOPMENTAL AND INITIAL CERTIFICATION PROGRAM CONTROL

16.1 Development versus certification

16.1.1 It is often difficult for an applicant organisation, inexperienced in type certification, to differentiate between the overall program elements of work which can be separated and classified “developmental” and “certification”. Although the processes may be inter-twined, their objectives are basically different. The former can be quite independent of CASA involvement and a regulatory approval process, whilst certification must involve the Authority.

16.1.2 Since all development work is now done under an experimental certificate, an applicant will be free to develop and test an aircraft or other product with program flexibility. However, an applicant should aim to develop aircraft structures and systems towards the configuration intended to show compliance from the outset. Whilst it is entirely possible for the applicant to design, build and test fly a prototype under the experimental certificate provisions, it is important for the applicant to be aware that unless the prototype

can be shown to be representative of the type design in all areas that may affect the validity of its use as a certification test article, it may be necessary to construct a second prototype under full conformity procedures before the process can move from “development” into “certification”.

16.1.3 If the aims of paragraph 16.1.2 above are not fulfilled, then the liabilities of extra time and extra costs will be encountered, for example:

- (a) provision of new test articles;
- (b) the repetition of tests required; and
- (c) the extra involvement of CASA officers.

16.2 Responsibilities of the applicant and the Authority

16.2.1 The applicant has the following program responsibilities:

- (a) showing compliance with the CASRs applicable to the specific aircraft type or product;
- (b) submission of the Type Design (in stages) and substantiating data;
- (c) submission of statements of conformity for each aircraft part presented for testing;
- (d) submission of statement of conformity for the aircraft as a whole, presented for testing.
- (e) performing all inspections and tests required by the Authority in order to show compliance;
- (f) accomplishing the preflight test requirements of CASR 21.35(1), and then making all flight tests found necessary by the Authority; and
- (g) preparing the draft of the TCDS (to be forwarded to the Authority in electronic format).

16.2.2 The Authority has the following program responsibilities:

- (a) providing guidance to an applicant throughout the certification process;
- (b) establishing the certification basis;
- (c) establishing special conditions;
- (d) determination of equivalent levels of safety;
- (e) approving drawings, reports, data, and flight manuals. (However, most drawings, reports and specifications will normally be approved by an authorised person employed by the applicant.);
- (f) performing type inspections and tests needed to verify compliance with the certification requirements and conformity with the Type Design;
- (g) preparing the TIR; and
- (h) issuing the TC and TCDS.

16.3 Technical panel meetings

16.3.1 From the outset of the program, the ASSD Project Manager will have a central company certification point of contact identified; this person may be called the chief certification engineer, certification coordinator etc. All certification tests, whether witnessed or not, must be coordinated by this person. He or she also normally organises

and attends technical panel meetings between the Authority and company representatives (not to be confused with TCB meetings).

16.3.2 The following points should be noted:

- (a) ASSD technical specialists may be called to attend as the Compliance Summary is developed and detailed review of any one technical discipline is undertaken;
- (b) Issue Papers will be raised in the event of technical disagreement between parties, or where interpretation of requirements is difficult, or where resolution of problems may be protracted;
- (c) the Authority will strive to ensure dealings with consultant engineers on all technical levels will be through or with the applicant at all times.

16.4 Applicant contact with the ASSD

Nothing precludes the applicant from maintaining dialogue with the appropriate nominated specialists once initial contacts have been made through the TCBM process. However, any requests for formal involvement of specialists by the applicant in the program (such involvement not having been arranged by the ASSD Project Manager) must be through the Project Manager. Direct interaction between the applicant and the ASSD specialists is not precluded, providing the ASSD Project Manager is fully aware of this and any technical outcomes, including the nature and extent of any advice and guidance provided to the applicant.

16.5 Test plans

16.5.1 All non-developmental test proposals should result from certification requirements, as laid down in order in draft form in the Compliance Summary. If this is followed, then the test proposals, demonstrations and results can be placed in a proper and workable framework. For example, the Authority needs to assess factors such as the levels of witnessing, test factors, materials variability, and how a rig is representative or otherwise of the real or certification situation (which are often not the same). These points must be agreed with the applicant during a panel meeting, not at the actual test. The ASSD Project Manager must have had time to assess all written proposals. If last-minute changes are made, then the ASSD Project Manager's copies must be amended accordingly. All proposals and test reports must be filed together in a logical system.

16.5.2 As a minimum, the following should be included in the relevant test plan:

- (a) description of item(s) to be tested;
- (b) relevant test equipment;
- (c) how test equipment will be calibrated and approved;
- (d) how compliance will be shown by the tests;
- (e) detailed test procedures to be used.

16.5.3 All test articles must be conformed, and statements of conformity provided by the applicant (see paragraph 16.7).

16.6 Test witnessing

16.6.1 All important structural and rig tests will be witnessed by a CASA representative. Where the test is relatively straightforward, such witnessing may be carried out by a local CASA officer. Costs to the applicant will be borne in mind in this respect. More complex

tests and those requiring engineering interpretations will be attended by the designated CASA engineer. The need for conformity inspections prior to and after test will also need to be satisfied.

16.6.2 After the CASA officer witnesses the test, he or she will write a report for the relevant CASA file(s) containing the following:

- (a) a description of the test;
- (b) a description of the results obtained;
- (c) the decisions reached; and
- (d) the recommendations which have been made to the applicant.

16.6.3 The applicant should prepare a test report detailing the data for each test and an explanation on the calculations necessary to evaluate the data. The report should include conclusions and recommendations and be presented to the Authority for approval, if an approval authorisation for this is not held.

16.7 Conformity inspections and statements

16.7.1 Conformity inspections are required to ensure that the product being certificated complies with the Type Design. For any certification test, the applicant must submit a statement of conformity (as required by CASR 21.53(2) which states “*Each applicant must submit to the Authority a statement of conformity for each aircraft or part thereof presented to CASA for tests. This statement of conformity must include a statement to the effect that the applicant has complied with subregulation 21.33(1)*”), declaring that for the test purpose:

- (a) materials and products adequately conform to the specification in the Type Design;
- (b) parts of the products adequately conform to the drawings in the Type Design; and
- (c) the manufacturing processes, construction and assembly conform adequately to those specified in the Type Design, to the extent necessary to ensure that the test is a valid indication of the performance of the design.

16.7.2 Deviations from the Type Design currently defined must be stated.

16.7.3 When the certification test is to be witnessed by a CASA officer, the applicant’s statement of conformity must be submitted in advance. The Statement of Conformity (Test Procedure), CASA Form No 724, obtainable at CASA Offices, may be used.

16.7.4 A CASA conformity inspection should be successfully conducted before any official certification test is carried out.

16.8 Engineering compliance inspections

16.8.1 Any aspect of product design, for which compliance with the certification requirements cannot be ascertained through a review of drawings or reports, should receive an engineering compliance inspection.

16.8.2 The purpose of an engineering compliance inspection is to ensure that an installation complies with the CASRs. This inspection should not be confused with a conformity inspection as described in subsection 16.7 above. A conformity inspection is carried out to determine conformity to engineering data, whilst an engineering compliance inspection is carried out to determine compliance with the CASRs. An engineering

compliance inspection provides an opportunity to review an installation and its relationship to other installations on a product.

16.8.3 The product should conform to the Type Design prior to the carrying out of the engineering compliance inspection. Findings will be documented and included in the Type Design data file. Engineering compliance inspections may be delegated to company personnel, who will be provided proper guidance in order to effectively make the findings on behalf of the Authority.

16.8.4 Engineering compliance inspections for aircraft interiors are generally more complex than other compliance inspections. This is primarily due to the many varied regulatory requirements that must be complied with (e.g. emergency lighting, emergency exit arrangements, ordinance signs, aisle widths, cockpit controls, waste containers, placards, and occupant protection). Engineering compliance inspections for interiors are generally not delegated.

16.8.5 Control system compliance inspections are accomplished to determine ease of control operation, strength of components, and detection of interference or deflection of control system linkages.

16.8.6 Regulatory design requirements for flammable fluid fire protection require separation and isolation of flammable fluid-carrying lines from ignition sources of all types. The physical inspection of installations is required to assure compliance.

16.8.7 Hydraulic/electrical system routing requires inspection to assure that proper support and separation is maintained.

16.9 Evaluation of certification data by the Authority

16.9.1 Design data consists of drawings, specifications, and reports necessary to define and substantiate the product. This includes information on configuration, materials and processes. Data submitted by the applicant should be complete and in a logical format. The applicant should submit data in a timely manner, to assist in the progress of the certification program.

16.9.2 There are two options for an applicant in regard to certification data:

- (a) have the data approved by an authorised person; or
- (b) submit the data to the Authority for approval.

16.9.3 Normally, the finding of compliance made by an authorised person in accordance with the agreed certification plan will be accepted by the Authority. The Authority's own participation in the project will be reduced to the minimum necessary to substantiate compliance with the airworthiness requirements, depending on the experience and knowledge that the Authority has of the person(s) who approved the data.

16.9.4 The Authority conducts surveillance on the activities of authorised persons and may suspend any TC, STC, or ATSOA issued that was based on data that is found not to adequately justify a finding of compliance.

16.9.5 Data submitted by an authorised person who has approval privileges specified in an IoA, and/or as detailed under the agreed certification plan, should be marked as approved prior to submission. The data is to be accompanied by a statement of compliance with the applicable regulations.

16.9.6 For data submitted by an authorised person not covered under the conditions specified in the IoA, or if so designated in writing by the Authority under the agreed certification plan, the data is to be accompanied by a statement of compliance with the applicable regulations marked as “recommended”. When satisfied that compliance has been shown the Authority will either approve the data or authorise the person, in writing, to approve the data. Data not acceptable will be returned to the applicant with a summary of the deficiencies, and a request for revision and resubmission. Note that the Authority is not responsible for the development of methods or the accuracy of calculations. This scenario involves more effort on the part of the Authority to establish compliance than the process described in paragraph 16.9.5 and thus will be more time consuming and costly to the applicant. It is therefore strongly recommended that the applicant engages the services of appropriately skilled authorised persons for the range of activities or a suitable Approved Design Organisation, for the project.

16.9.7 At the completion of the certification program, the ASSD Project Manager will suitably annotate the top level drawing list and document list as the lists of data accepted or assessed by the Authority as showing compliance with the applicable airworthiness standards.

16.10 Interim TCB meetings

Interim TCB meetings may be required to resolve problems that arise during the type certification program for items unable to be resolved at the technical level. Interim meetings may be requested by the Authority or the applicant, and need only involve the necessary participants, including specialists from the ASSD, needed to resolve problems. The ASSD Project Manager will be responsible for setting up the meetings and informing the necessary participants.

16.11 Design variations

It should be noted that as the design and test work develops, the applicant must have an acceptable system of recording design variations in terms of changes to the Compliance Summary, reports and drawings. The Compliance Summary is continually updated and refined. Issue Papers, as previously discussed, are raised as necessary and continuously updated. If non-compliances with the requirements of the Compliance Summary appear, then the applicant must strive to rectify these. It may be possible to resolve initial findings of non-compliance by an Equivalent Safety Determination (ESD).

16.12 Equivalent Safety Determinations

16.12.1 An ESD is the culmination of a process whereby compliance with a particular design requirement has been proposed, demonstrated and finally accepted by a means other than that specified in the design requirement. ESDs may be applied to physical components or systems (or indeed lack thereof), or to characteristics such as aircraft handling qualities. ESDs may be made when a specific design standard (e.g. an item of FAR 23) cannot be met exactly, but the safety intent of the standard can be met by other means, often by compensating factors. ESD proposals are put forward by an applicant during the design submission phase, or during the course of development and testing of components, systems or the aircraft as a whole. ESDs are processed as discrete Issue Papers. The ESD Issue Paper should be drafted in typed form by the applicant, using the following headings:

- (a) Major Heading Issue Paper No. (obtained from the CASA Project Manager), with the following immediately underneath: “EQUIVALENT SAFETY DETERMINATION PROPOSAL”.
- (b) Section Headings
 - (i) Regulatory reference;
 - (ii) Nature of ESD proposal;
 - (iii) Justification for proposal; and
 - (iv) CASA comment

16.12.2 The applicant should complete (i), (ii) and (iii) above and submit the completed ESD to the Authority.

16.12.3 Section (iv) will be completed by the ASSD Project Manager after consideration of the ESD application.

16.12.4 Final processing will consist of the addition of a “ASSD Determination” block, and the signature of the Head of Certification Standards, with a final typed statement at the bottom, “Issue Closed”.

16.12.5 A sample ESD Issue Paper can be provided by the Authority on request.

16.12.6 A listing of ESDs must be placed in the TCDS, as prepared in draft form by the applicant.

16.13 Design changes prior to TC issue

16.13.1 Note that CASR Part 21 Subpart D, titled “Changes to type certificates” addresses regulatory requirements for design changes and associated certification procedures to be followed after a TC is issued. Design changes may also be incorporated during a type certification program.

16.13.2 Such a change may, for instance, be an election by the designer/manufacturer, to enhance the performance, useability etc. of the aircraft or other product. If this is made prior to certification testing, then only drawings, specifications, test plans etc. need to be amended. If the change is made after certification testing of an applicable part, sub-assembly etc., then under normal circumstances, the affected element will require recertification. This may involve a test plan being resubmitted, a revised Statement of Conformity being issued, and the test carried out again. Amendment page(s) to the relevant report(s) may then be appropriate, rather than new test reports being raised from scratch.

17. THE FLIGHT TEST PHASE

17.1 General

17.1.1 Test flying is carried out after the issue of an experimental certificate, pursuant to CASR 21.191. Refer to advisory circular AC 21.10 “Experimental Certificates” for further information and application procedures.

17.1.2 Flight testing may be considered to comprise three distinct phases:

- (a) manufacturer’s developmental test flying – i.e. testing conducted under CASR 21.191(a) during the “work-up” phase of the aircraft, prior to the commencement of the certification phase;

- (b) manufacturer's test flying conducted to meet the requirements of CASR 21.35. This is conducted AFTER conformity has been established of the flight test article, and the prerequisites of CASR 21.35 have been met, and culminates in the generation of the applicant's Flight Test Report (FTR). Note that the Authority will not commence any test flying until the applicant's FTR has been accepted. (CASR 21.191(b) refers).
- (c) CASA test flying, culminating in the issue of the CASA Flight Type Inspection Report (FTIR). CASR 21.37 allows the applicant to use a test pilot other than one holding a test pilot authorisation.

17.1.3 The manufacturer's test pilot must hold an appropriate endorsement under regulation 5.22 of CAR 1988, or an appropriate endorsement under regulation 5.50 of CAR 1988 (CASR 21.37 refers).

17.1.4 Manufacturer's test pilots should be encouraged to attend all TCB meetings on projects with which they are involved. Attendance may be mandatory if major flight compliance, safety or other relevant certification issues are a problem.

17.1.5 The applicant has the responsibility for control of all the flight test data, so that reports provided to the Authority to support claims of compliance are relevant to the conformed aircraft.

17.1.6 Airworthiness regulatory authorities often recognise "flight test (handling and stability)" and "flight performance" to be two different technical disciplines. For simple projects, the test pilot may acquire all in-flight data. A qualified person will analyse flight performance results and produce the necessary flight manual tables, graphs etc.

17.2 Weighing

17.2.1 An accurate weight and Centre of Gravity (CG) determination must be made prior to initial flight tests commencing. CAO 100.7 refers.

17.2.2 An accurate CG determination is essential for prototype handling assessments and stall speed measurement. Applicants should be aware that design standards set tolerance limits on permissible weight/CG variation during flight testing; exceeding these limits renders the test invalid (for example see FAR 23.21). This means that close control and recording of weight and centre of gravity location are essential during all flight tests that are intended to show compliance.

17.3 Pre-first flight inspection

17.3.1 Applicants are advised to carry out a ground inspection to ensure that the prototype aircraft is in a safe condition for first flight. It should not be confused with the formal ground type inspection, although it might allow some early completion of parts of the latter.

17.3.2 Major precautionary safety issues should also be reviewed at this time:

- (a) emergency egress features checked and functionally tested;
- (b) rescue, firefighting and other emergency facilities on call as required;
- (c) use of parachutes;
- (d) use of spin chutes and functional testing if applicable;
- (e) use of helmets and other protective clothing and equipment; and
- (f) detailed review of all take-off and post-take-off emergency procedures.

17.4 Other flight test requirements

17.4.1 Prior to certification flight testing as required by the Type Inspection Authorisation (TIA) (see Section 18), the applicant must check that the following specific requirements have been satisfied:

- (a) compliance with the applicable structural requirements of the CASRs (and thus the relevant certification basis);
- (b) all necessary ground inspections and tests have been completed;
- (c) the aircraft conforms with the type design;
- (d) the applicant's flight test report has been received by the Authority;
- (e) adequate provision has been made for emergency egress and use of parachutes;
- (f) the Authority has received a flight test instrument calibration and correction report as required by CASR 21.39; and
- (g) the Authority has received a statement of conformity for the completed aircraft.

17.4.2 As well as demonstrating compliance with the applicable flight handling, stability, performance and system operating design requirements for the aircraft type, CASR 21.35 requires that Function and Reliability (F & R) testing for those aircraft being type-certificated under CASR 21.21 (including the engine reliability testing requirements of CASR 21.35(6)), be included in the flight test program requirements. (Gliders, and aeroplanes for the normal, utility, acrobatic or commuter category, with an MTOW below 2720 kilograms, are exempted from this.)

17.4.3 Note that CASR 21.35(3) requires that the aircraft used for showing compliance with the certification basis requirements, be the one also used for the F & R testing, if practicable.

17.4.4 Note also that the applicant has corrective action obligations should:

- (a) the applicant's test pilot be unable or unwilling to make any of the required flight tests; or
- (b) items of non-compliance with requirements are found that may make additional testing meaningless or that would make further testing unduly hazardous.

18. THE TYPE INSPECTION AUTHORISATION

18.1 The Type Inspection Authorisation (TIA) is prepared by the Authority to formalise the requirements for official conformity, airworthiness inspections and flight tests necessary to fulfil the requirements for type certification. The TIA is issued when the examination of the technical data required for type certification is completed, or in more normal circumstances, has reached a point where it appears that the aircraft or product being examined will meet the pertinent regulations.

18.2 The TIA is in part the authorisation for a CASA officer to fly the aircraft, and must be issued prior to any CASA flight test.

18.3 At the time the TIA is prepared, a letter of notification to the applicant will also be prepared. The letter informs the applicant that authorisation for formal type inspection has been issued, and includes a copy of the TIA for the applicant's information and records.

18.4 Final conformity inspections will be accomplished by CASA personnel prior to the official CASA certification flight tests.

19. THE TYPE INSPECTION REPORT

19.1 The Type Inspection Report (TIR) is a formal report which contains results of inspections and tests as required by the TIA, and which forms part of the Type Design. The TIR is completed jointly by authorised engineering representatives working for the applicant, and CASA staff. Subparts are signed by those carrying out the specific inspections and tests. The TIR as a whole is signed off by the ASSD Project Manager.

19.2 Part I of the TIR is titled the ground inspection report. This provides a means of recording and reporting the configuration of the product and reporting all significant unsatisfactory conditions found as a result of the inspectors' and representatives' activities during the type inspection. All unsatisfactory items will normally be resolved prior to accomplishing Part II, (flight test requirements) of the TIA. Part I of the TIR should be completed as soon as possible after accomplishing all TIA inspections.

19.3 Part II of the TIR is the flight test report. Flight test personnel prepare the flight test report with the detailed format being left to their discretion. Locally approved formats, narrative reports, or applicable pages from the appropriate flight test report guide are acceptable, provided all TIA items are addressed.

19.4 The applicant's test pilot may partially write Part II of the TIR. CASA engineering and flight test personnel will review the report to ensure adequate documentation. In addition to test documentation, sufficient administrative or general flight test information should be presented to show compliance with CASR Part 21 requirements. The information should include, but not be limited to, the following:

- (a) serial number of aircraft tested;
- (b) where and when the aircraft was tested;
- (c) details of alterations made during CASA flight testing;
- (d) flight test log (excluding functional and reliability test and ferry time) with total official CASA flight test time;
- (e) total number of flight hours of F & R testing if required;
- (f) certification information; sufficient information should be presented to indicate:
 - (i) operating limitations including category (e.g. normal, utility, acrobatic) and type of operations authorised (visual flight rules, instrument flight rules, day, night, icing etc.). Approved manoeuvres may be presented if appropriate;
 - (ii) equipment required for each type operation. This should agree with the limitations section of the draft flight manual;
 - (iii) limitations for weight, centre of gravity, airspeeds, powerplant operations etc.; and
 - (iv) recommended airspeeds for climbs, autorotations, approaches etc.

19.5 Sufficient information should be presented to show compliance with the TIA and CASR Part 21 requirements. If the procedures deviate from approved test plan or

established test methods, the procedures used to show compliance should be documented. The flight test report may be divided into sections such as:

- (a) equipment and flight operation;
- (b) powerplant operation;
- (c) performance; and
- (d) handling qualities.

Note: The applicant's flight test report should be referenced in Part II of the TIR.

19.6 Additional information necessary to show compliance with the TIA and CASR Part 21 should be presented as appendixes or attachments to the report and referenced on the table of contents. The supporting information may include, but not be limited to, the following:

- (a) other flight test data;
- (b) approved test plans; and
- (c) draft flight manual;

19.7 The TIR must be in an acceptable draft state for the final TCB meeting. This will require joint effort by the ESG (and possibly ASSD specialists), and the applicant's relevant personnel. The TIR should be completed within ninety days of TC issue. The applicant's copy forms part of the Type Design.

19.8 Certain sections of the applicant's flight test report may form part of the FTIR when accepted as such by the CASA Test Pilot.

20. THE TYPE CERTIFICATE DATA SHEET

20.1 The TCDS is a part of the TC. It documents the conditions and limitations necessary to meet the airworthiness requirements of the CASRs, and is thus a key Type Design document.

20.2 The first draft of the TCDS should be prepared by the applicant. Final rework and approval is the responsibility of the ASSD Project Manager, with input from ESG engineers, ASSD specialists, and the CASA Test Pilot. The TCDS should be completed as soon as possible after approval of the engineering data. It may be in a partial state when the TIA is issued, but should be in final draft form for the final TCB meeting and completed by the time the TC is issued. The TCDS at this time will be designated Issue 1.

20.3 A sample TCDS is available from CASA upon request.

21. THE FLIGHT MANUAL

21.1 The flight manual for an aircraft type and model is the primary airworthiness certification document. It must reflect the important conditions, limitations and procedures established by an aircraft certification program. It must carry specific CASA approval, over and above the approval inherent in the TC. An approved flight manual for an individual aircraft is also a necessary prerequisite for CoA issue. The importance of a flight manual is reflected in CASR 21.5. The drafting of the flight manual is the responsibility of the applicant.

21.2 The following contain specific format directions and minimum acceptable standards of data presentation:

- JAR-VLA aircraft JAR-VLA Appendix H
- CAO 101.55 ultralight aircraft CAO 101.55 Appendix 1

21.3 As well as the above, applicants should be aware of the U.S. General Aviation Manufacturers' Association (GAMA) standards for flight manual format. These must be followed. Any conflict between the standards vide paragraph 21.2 and the GAMA standards will be resolved on a case-by-case basis.

21.4 An Australian aircraft designer/manufacturer must ensure the requirements of paragraphs 21.2 and 21.3 are followed. There are international as well as national obligations in this regard.

21.5 There is no set timeframe for development and production of the flight manual during a type certification program. However, applicants are urged to start mapping out the document as early as possible in the program, and refining and adding to it as results of tests provide the necessary data and limitations. The ESG project leader will periodically review the draft of the flight manual as it is developed, providing correction guidance to the applicant as necessary. When the flight manual is in a state for approval, it will be sent to the Certification Standards Branch, ASSD. The document will then be scrutinised by ASSD specialists. Concurrence by the relevant CASA officers, and particularly the CASA Test Pilot, with the operating limitations, and normal and emergency procedures sections, is essential before approval. The TC holder will continue to have obligations in regard to the status of the flight manual after aircraft production is commenced and aircraft enter service, and the TC holder is also required to ensure each owner of an aircraft of the type is issued with the latest revision copy of the flight manual.

21.6 Applicants should also note the particular engine cooling requirements of CASR 21.5 (3).

22. FUNCTION AND RELIABILITY TESTING

22.1 F & R testing need not necessarily apply to flight phases only, and may well have commenced for systems prior to the flight test phase commencement. F & R flight testing may be carried out during the developmental and certification test periods, or indeed after TC issue, but prior to issue of the first CoA for the type.

22.2 In this case, the aircraft may continue to be operated on the experimental certificate which was issued for the purpose of showing compliance. Indeed, CASR 21.191(b) makes specific provision for this. The extent of F & R testing required will be a function of the size and complexity of the aircraft, and the degree to which the instructions for continuing airworthiness depend on the F & R data gathered. During this period, of course, revenue flying in any form will not be allowed.

22.3 See paragraphs 17.4.2 and 17.4.3 in regard to some specific F & R testing requirements.

23. THE FINAL TCB MEETING

23.1 The final TCB meeting is held when the TCB chairman and ESG project leader jointly agree that the applicant has demonstrated compliance with all the applicable

airworthiness standards of the certification basis. It is usually held in Central Office, Canberra, prior to TC issue. The purposes of the meeting are to:

- (a) establish that all the necessary data and reports have been provided;
- (b) review the Compliance Summary in detail, and to discuss any non-compliances and open issues;
- (c) review and resolve any outstanding ESDs;
- (d) review in detail the draft flight manual, the draft TCDS, and the draft TIR;
- (e) agree to the methods by which non-compliances and open issues may be disposed; and
- (f) review arrangements for continuing airworthiness control. (e.g. provision of maintenance manual, service bulletins, service letters, approved structural repair manual, and approved Master Minimum Equipment List (MMEL) etc.).

23.2 The applicant will normally be asked to attend this meeting. If any outstanding issues are the subject of major concern or disagreement, the chairman may adjourn the meeting to a new date.

24. ISSUE OF THE TYPE CERTIFICATE

24.1 Subsequent to the final TCB, and after all non-compliances and open issues have been addressed, the Authority will be in a position to issue the TC. The TC is signed by the Head of Certification Standards, ASSD (it cannot be signed by an authorised person), and the original is given to the applicant. Copies are held by the Authority as prescribed by internal procedures documentation.

24.2 The TC will list the CoA categories available from the categories listed in paragraph 5.3. Note that a design certification by the applicant prior to TC issue, as was required by the now-repealed CAO 100.3, is not necessary.

24.3 Note that the TCDS does not have to be completely accurate and finished at this time. Any discrepancies, omissions or notes should be highlighted in such a case. However, the Authority and the applicant will strive to have the TCDS completed as soon as possible after TC issue.

24.4 Similarly, the flight manual and maintenance manual may not be in a completely finished state prior to TC issue, but must be in the fully correct and finished state prior to issue of the first CoA for the type. Note again that the TIR should be completed within ninety days of TC issuance, as discussed in paragraph 19.7.

24.5 The Authority will complete a certification summary report after TC issue. The Authority may request certain information from the applicant in order to write the summary report. This captures the project's unique technical requirements and lessons learned for the Authority, and is not cost-recoverable.

25. STATUS OF THE TYPE CERTIFICATE

25.1 Availability

25.1.1 The holder of a TC must make the TC and the Type Design available at any time for examination by the Authority on request. Note that the Authority has a right to TC data, and does not need to justify the request.

25.1.2 The Authority can only provide non-proprietary data to other parties. Any proprietary data held by the Authority is treated as commercial-in-confidence.

25.2 Duration, cancellation and suspension

25.2.1 A TC remains in force unless it is cancelled, or during any period of suspension.

25.2.2 The Authority may suspend or cancel a TC if there are reasonable grounds for believing that the TC no longer provides a reliable guide that the aircraft can reasonably be expected to be safe for its intended use when operated under any condition limiting its intended use. Note that cancellation or suspension of a TC will invalidate the CoAs of all aircraft built under the TC, effectively grounding the fleet of such aircraft.

25.2.3 Upon cancellation or suspension of a TC, the holder must return the original TC to the Authority. The word “cancelled” or “suspended” (as appropriate) is stamped or typed on the body of the original TC, as well as on the date and signature of the issuing CASA delegate. (An appropriate notation is also made on the CASA file copy of the TC). The cancelled original TC is then returned to the holder. In the case of a suspended TC, when the suspension ends, the TC will be reissued to the holder.

25.2.4 A note is also added to the TCDS, documenting the cancellation date of the TC, and advising that the TCDS is not valid for aircraft manufactured after the cancellation date.

25.2.5 The Authority must cancel a TC if requested to do so to by the holder (refer to CASR 21.2E(1)). A notice to this effect must be placed in the *Commonwealth Government Gazette*.

25.3 Transfer of the TC

25.3.1 CASR 21.47 makes provision for transfer of a TC, or for the TC to be made available to third persons by licensing agreements. The Authority must be notified in writing within thirty days after transfer. CASR 21.47 details other notification obligations.

25.3.2 The recipient of the transferred TC accedes to all privileges of a TC holder and all responsibilities which includes the continued airworthiness responsibilities for all aircraft produced under that TC, inclusive of those aircraft produced by the previous TC holder.

25.3.3 When TC ownership is transferred, the TC must be reissued. The TC holder should submit the original TC to the Authority with a transferred endorsement completely filled out on the reverse side of the TC. This changes the ownership, and the effective date is the date of the TC holder’s signature. The signature can only be the individual(s) shown as the TC holder. In the case of a TC issued to an organisation, it is necessary to submit an affidavit signed by a duly elected officer of the transferring organisation (with the company seal where the holder is a company), certifying that the person signing as transferor is duly authorised and empowered to execute the transfer endorsement on behalf of the TC holder.

25.3.4 The Authority will only recognise transfer endorsements accomplished on the original TC. A TC holder who cannot locate the original TC can obtain a duplicate by making a written request to the Authority, and submitting a statutory declaration attesting that the original TC is lost, misplaced or destroyed. A duplicate TC will be reissued with the statement under the TC No. stating “Reissued on (date) to supersede the original TC which has been lost or misplaced”. (The Authority’s records will be annotated to show that the original TC is null and void). The original should be surrendered to the Authority if it is subsequently recovered.

25.3.5 Reissue of a TC also requires the TCDS to be revised to show the name of the new holder.

25.3.6 Reissue of the TC will not occur until the new holder and the Authority reach an agreement on maintenance and storage of the Type Design and other relevant data.

25.3.7 A company name change also requires that the TC be reissued.

25.3.8 Note that persons or entities wishing to manufacture the product from a surrendered TC may:

- (a) obtain copies of the TC data which now resides in the public domain, and apply for a new TC through the normal approval process. Since a new and distinct TC would be issued in this case, the certification basis would be established in accordance with CASR 21.17 and not CASR 21.101; or
- (b) request that the TC be reissued in their name. That request will be honoured if the applicant is qualified and in possession of all information that would constitute the TC in accordance with CASR 21.41. The applicant should be aware that he or she assumes all responsibilities for the product as well as the privileges of a TC holder as defined in CASR Part 21, Subpart B. The applicable procedures in this paragraph for transfer of a TC also apply.

25.3.9 Occasionally, TC holders go out of business without transferring their certificates, or they cannot otherwise be located. In these situations, a decision is often needed for disposition of the approval records and design data. Public access to data for continued airworthiness purposes can also come into question. The Authority will attempt to locate the person or company listed as owner on the TC prior to disposition of airworthiness approval records to the public.

25.3.10 If reasonable attempts at contact have been made and the TC owner cannot be located, the certificate is considered to be “surrendered” and will be processed as follows:

- (a) the Authority assumes responsibility for the continued airworthiness of the product in the absence of the former certificate holder;
- (b) If the provisions of paragraph 25.3.8 above were not previously exercised, then the Authority may reissue the certificate to the former TC holder, or to a third party who presents to the Authority a valid TC transfer endorsement. They then reassume continued airworthiness responsibility for the aircraft. After the certificate is reissued, the Authority will regard the data as being proprietary, and public access to the data ceases.

25.3.11 Requests may be received by the Authority from TC holders to “split out” one or more models (aircraft, engines, or propellers) from a TC, to allow the transfer of the type design approval of those models to another party, without transferring the complete TC. Such a practice is not allowed. Splitting out models would require the issuance of a new TC to the transferee, and the airworthiness requirements of CASR Part 21 would prevail. In particular, the airworthiness requirements specified by CASR 21.17(1)(a) must be met.

25.3.12 This position does not preclude a TC holder from selling or otherwise making his or her design data available to another party. If the transferee (receiving party) wishes to produce aircraft, engines, or propellers, and the designs are eligible for CASA certification, several alternatives are available. The receiving party may:

- (a) produce the product under licence to the extent allowed under CASR Part 21 Subparts F or G, without becoming the holder of the TC; or

- (b) obtain a new TC for the aircraft, engine, or propeller under the provisions of CASR Part 21 Subpart B.

25.3.13 If option (a) of paragraph 25.3.12 is selected, the holder of the TC remains responsible for the continued integrity of the approved type design, and must continue to be the Authority’s point of contact for resolving safety issues that may require corrective action (e.g. Airworthiness Directives (ADs)).

25.3.14 If option (b) of paragraph 25.3.12 is selected, the Authority will allow the new applicant as much credit for previously approved design data and tests as is practicable in showing compliance with the later requirements. In determining the aircraft certification basis, consideration will be given to equivalent safety findings where clearly documented evidence is presented by the applicant that shows the objectives of the later requirements have been met. However, the certification basis should remain those requirements set forth by CASR Part 21 Subpart B.

25.3.15 If option (b) of paragraph 25.3.12 is selected, and the applicant for the new TC is located outside Australia, a new TC will not be issued unless the applicant is located in a country that has a Bilateral Airworthiness Safety Agreement with Australia. In these cases, the applicant must seek a new Australian TC through the NAA of that country, and the Authority will work through that NAA to agree on equivalent safety findings.

25.4 Amendment to a TC

25.4.1 A TC holder desiring a type design change for a product may apply for a STC, or an amendment to the original TC. Persons other than the TC holder may not apply for an amendment to the TC.

25.4.2 The Authority will require an application for a new TC if the changes are so extensive that a substantially complete investigation of compliance with the applicable regulations is required.

25.4.3 Application for a TC amendment is made by letter to the CASA ASSD. If the amendment involves a model change of the product, CASA Form No 733 “Type or Supplemental Type Certificate – Application”, should be used.

25.5 Privileges and responsibilities of the TC holder

25.5.1 The holder of a TC for an aircraft may obtain CoAs for those aircraft. The TC holder for an aircraft engine or propeller may obtain approval for installation on type-certificated aircraft. A TC holder for a product (ie any or all of the above) may obtain a PC (see AC 21.14), and obtain approval for the manufacture of replacement parts for the product.

25.5.2 The TC holder also has responsibilities for providing instructions for the continued airworthiness control of the aircraft. In practice, this is achieved by the issue of service bulletins and amendments to maintenance and flight manuals.

25.5.3 In particular, the holder must specifically report to the Authority any failure, malfunction or defect in any of the following that the holder is aware of:

- (a) an aircraft, aircraft engine or propeller, or any other part or article manufactured by the holder; or
- (b) a manufacturing process specified by the holder.

25.5.4 Specific requirements are detailed in CASR 21.3, “Reporting failures, malfunctions and defects”.

26. CONTINUED AIRWORTHINESS CONTROL

26.1 The holder of a TC is responsible for ensuring continued airworthiness data on the aircraft type for which he or she is the TC holder is available to all operators of the type, located within or outside Australia. (Refer paragraph 25.5.2)

26.2 Such continued airworthiness data may be in the form of service bulletins, amendments to maintenance manuals, illustrated parts catalogues and other manuals, service letters etc. TC holders also have an obligation to provide the Authority with defect reports, and any other information the Authority required in relation to the drafting and issuing of ADs.

26.3 Note that the Authority only formally approves the mandatory Certification Maintenance Requirements (CMRs) and the airworthiness limitations section of the maintenance manual, by virtue of this section being part of the Type Design (see CASR 21.31(1)(c)). CASR 21.50(1) requires TC holders to make particulars of any changes to this section available to operators.

26.4 Note also that CASR 21.50(2) requires that the TC holder must provide one set of complete instructions for continued airworthiness (maintenance manuals etc.) to each operator on aircraft delivery, or on the issue of the first CoA for the type, whichever comes later. It is therefore incumbent on the manufacturer to begin the drafting and printing process for this data early on in the certification program. In a strictly legal sense, the TC may be issued before the continued airworthiness instructions are complete and ready for issue, with the exception of the data discussed at paragraph 26.3.

26.5 CMRs should be included as part of the maintenance instructions portions of the instructions for continued airworthiness.

Note: The ICAO definition of a certification maintenance requirement is a recurring flight crew or ground crew check that is required by design to help show compliance with the appropriate type certification requirements by detecting the presence of, and thereby limiting the exposure time to, a significant latent failure.

27. DESIGN CHANGES

27.1 Design changes that are incorporated during a type certification program were discussed in paragraph 16.14.

27.2 A whole Subpart of CASR Part 21 is devoted to changes made after type certification. This is CASR Part 21 Subpart D, titled “Changes to type certificates”. Subpart D sets out procedural requirements for a TC holder to obtain approval for changes in the Type Design, and includes definitions of major and minor changes to the Type Design. As the purpose of this AC is to describe the type certification process fully, such post-certification detail is beyond the scope of the AC. TC holders wishing to obtain more information on the change process should contact their ESG. The relevant ESG officers will be able to provide the necessary advice.

28. PROVISIONAL TYPE CERTIFICATION

28.1 The introduction of CASR Part 21 Subpart C, “Provisional Type Certificates” (PTCs) now allows applicants for type certification in Australia to apply for and receive PTCs, amendments to PTCs, and provisional amendments to TCs.

28.2 A PTC is a “temporary” TC that applicants may request whilst working towards TC issue. Particular advantages may be:

- (a) training of flight crews; sales, market survey and demonstration operations; and service testing of the aircraft, in lieu of, and after, the experimental certificate has been cancelled. This may provide scope for reduced insurance premiums;
- (b) marking an additional achievement milestone in the overall certification program; and
- (c) allowing the manufacturer to conduct crew training and sales flights before the TC is issued, and thus the time between receiving the TC and having the aircraft placed in service is reduced.

28.3 A PTC allows the relevant aircraft to be issued with a provisional CoA. A provisional CoA has privileges similar to those of an experimental certificate. This allows the holder of the PTC to continue testing of the aircraft and also to carry out the other operations described in paragraph 28.2.

28.4 Australian manufacturers of aircraft may apply for PTCs. Basic eligibility requirements include:

- (a) the applicant must have applied for, and be working towards, a TC;
- (b) a prototype aircraft must have completed 50 hours satisfactory time in service;
- (c) the aircraft must have been designed and constructed in accordance with the design standard nominated for issue of the type certificate;
- (d) the manufacturer must have determined suitable operating limitations for the aircraft;
- (e) the Authority must have been involved in the project and have sufficient knowledge of the design to issue the PTC.

28.5 PTCs are divided into Class I and Class II. One particular requirement for application for a Class II PTC is that “the applicant must hold a TC for at least one other aircraft in the same transport category as the subject aircraft”. (From CASR 21.83 (3)). Thus Class II PTCs are only of academic interest to the Australian aviation industry at this time.

28.6 The following are the application requirements for issue of a Class I PTC; an applicant is entitled to the issue of a PTC if the requirements are met (ref CASR 21.81):

- (a) formal application for the TC must have been made;
- (b) the Authority must be satisfied that the aircraft can reasonably be expected to be safe for its intended use when operated under the limitations established by the applicant (including limitations on weights, speeds, flight manoeuvres, loading, and operation of controls and equipment) unless, for each limitation not established, appropriate operating restrictions are established for the aircraft;
- (c) the applicant must certify in writing that:

- (i) the aircraft has been designed and constructed in accordance with the airworthiness requirements applicable to the issue of the TC applied for; and
 - (ii) the aircraft substantially meets the applicable flight characteristics requirements for the TC applied for; and
 - (iii) the aircraft can be operated safely under the appropriate operating limitations specified in (b) above;
- (d) the applicant must submit a report to the Authority showing that the aircraft has been flown in all manoeuvres necessary to show compliance with the flight requirements for the issue of the TC applied for and to establish that the aircraft can be operated safely in accordance with the limitations referred to above;
- (e) the applicant must establish an inspection and maintenance program for the continued airworthiness of the aircraft;
- (f) the applicant must show the Authority that the prototype aircraft has been flown for at least 50 hours under the experimental certificate. In the case of an approval of an amendment to a PTC, the Authority may reduce the number of required flight hours.

Note: A provisional flight manual is not required at this time. However, a copy of limitations, standard and emergency operating procedures, placards etc. must be prepared, which will form the basis of a draft flight manual.

28.7 Unlike TCs, PTCs have a maximum duration, as an incentive for manufacturers to complete the TC process in a timely manner. A Class I PTC is effective for 24 months after issue date. (12 months for Class II).

28.8 As provisional amendments to TCs apply to post-certification activities, in regard to the TC involved, they are not within the scope of this AC.

29. EXPERIMENTAL MILITARY AIRCRAFT

29.1 For information, experimental military aircraft built under an Australian military contract in Australia and identified by Australian military aircraft identification marks, do not require civil registration or the issue of experimental certificates, pursuant to CASR 21.191, for flight testing or demonstration prior to acceptance by the Australian Defence Force.

29.2 However, aircraft of military design built independently by manufacturers with the intention of demonstrating to prospective military purchasers, in Australian territory, and not having military identification, will be required to obtain civil registration and experimental certificates, since such aircraft would be considered civil aircraft.

30. NOISE CERTIFICATION

30.1 Noise certification for individual aircraft is required in Australia before the aircraft can legally operate in Australian territory. Aircraft noise is regulated through the *Air Navigation (Aircraft Noise) Regulations*, introduced under the *Air Navigation Act 1920*, in 1984. Noise certification, or lack of such certification, has no legal impact on type certification (in some other countries such as the USA, noise certification is an integral part of the type certification program) or individual CoA issue. However, if an individual

aircraft does not meet the Australian noise requirements, then it is illegal for that aircraft to operate in Australian territory, even though the aircraft may have a valid CoA.

30.2 Prior to the processing of the first CoA for the type, the manufacturer/TC holder must complete formal noise testing for long-term operation of the type in Australia. Noise testing requirements for normal light aircraft are as contained in ICAO Annex 16 Chapter 10. For CAO 101.55 aircraft, the requirements are laid down in subsection 9 of CAO 101.55. Airservices Australia will normally witness or actually carry out normal light aircraft noise testing; this is not necessary for the CAO 101.55 case. However, all results must be passed to Environment Monitoring Branch of Airservices, which will ultimately issue the noise certificate to the manufacturer/TC holder.

30.3 In the event that a long-term noise certification cannot be granted, at the time of the initial application, then the Environment Monitoring Branch of Airservices Australia in Canberra may, as an alternative, issue a “Permission to Operate” under subregulation 9A(2) of the *Air Navigation (Aircraft Noise) Regulations*. This may be on a limited duration/restricted route basis, and in that sense could be aligned to the terms of the experimental certificate of the test aircraft.

30.4 Contact should be made with the Manager of Environment Monitoring, Airservices Australia, GPO Box 367, Canberra, ACT 2601, or Fax 02 6268 4201, or email environment@airservices.gov.au.

31. FORMS

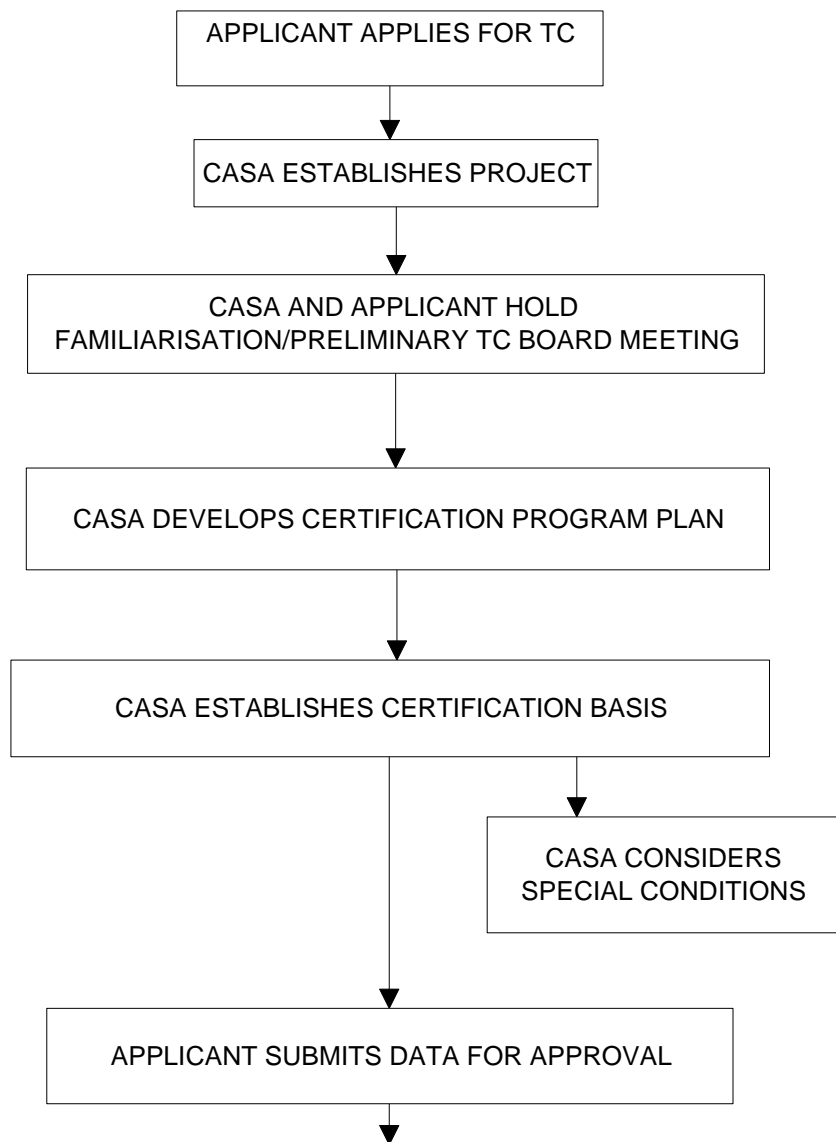
Until unique CASA forms are developed, the following US FAA forms may be used to record technical information relevant to applications for approval of an Australian designed aircraft; or forms developed by the responsible ESG for the local engineering procedures may be used:

- | | |
|----------------------|--|
| (a) FAA Form 8100-1 | Conformity Inspection Report; |
| (b) FAA Form 8110-1 | Type Inspection Authorisation; |
| (c) FAA Form 8110-3 | Statement of Compliance with Federal Aviation Regulations |
| (d) FAA Form 8110-4 | Type Inspection Report – Part 1: Rotorcraft Ground Inspection; |
| (e) FAA Form 8110-5 | Type Inspection Report – Part 1: Aircraft Ground Inspection; |
| (f) FAA Form 8110-8 | Type Inspection Report – Part 1: Free Balloons; |
| (g) FAA Form 8110-20 | Rotorcraft Ground Inspection; |
| (h) FAA Form 8110-21 | Aircraft Ground Inspection; |
| (i) FAA Form 8110-26 | Supplemental Type Inspection Report; |
| (j) FAA Form 8120-10 | Request for Conformity; |
| (k) FAA Form 81230-9 | Statement of Conformity. |

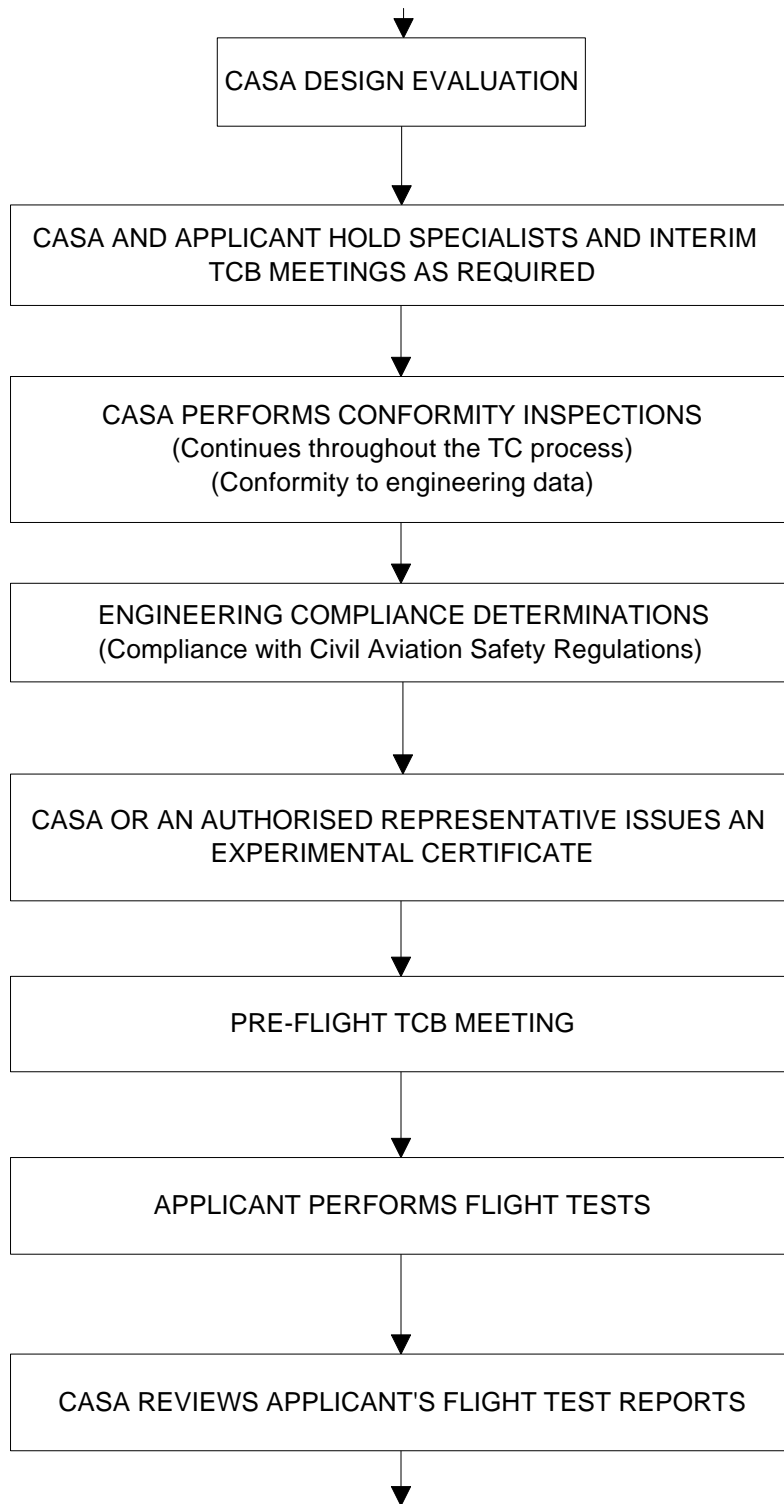
Richard G. Yates
Assistant Director
Aviation Safety Standards Division

APPENDIX 1
FLOW CHART OF THE TYPE CERTIFICATION PROCESS

TYPE CERTIFICATION PROCESS



(Continued on next page)



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