



Advisory Circular

Subject: Supplemental Type Certificates

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1.0 INTRODUCTION

- (1) This Advisory Circular (AC) is provided for information and guidance purposes. It describes an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

1.1 Purpose

- (1) The purpose of this document is to provide guidance in applying for and obtaining a supplemental type certificate (STC) in accordance with Subpart 521 of the *Canadian Aviation Regulations* (CARs). It is to be used in conjunction with AC 521-004.

1.2 Applicability

- (1) This document applies to:
 - (a) applicants for and holders of an STC;
 - (b) Transport Canada Civil Aviation (TCCA) personnel;
 - (c) delegates; and
 - (d) the aviation industry.
- (2) This AC does not apply to products approved by a Canadian Technical Standard Order (CAN-TSO) design approval.

1.3 Description of Changes

- (1) Not applicable.

2.0 REFERENCES AND REQUIREMENTS

2.1 Reference Documents

- (1) It is intended that the following reference materials be used in conjunction with this document:
 - (a) *Aeronautics Act* (R.S., 1985, c. A-2);
 - (b) Part I, Subpart 4 of the *Canadian Aviation Regulations* (CARs)—*Charges*;
 - (c) Part V, Subpart 21 of the CARs—*Approval of the Type Design or a Change to the Type Design of an Aeronautical Product*;
 - (d) Advisory Circular (AC) 500-016—*Establishing the Certification Basis of Changed Aeronautical Products*;
 - (e) AC 521-002—*Type Certification Requirements of Aircraft, Engines and Propellers*;
 - (f) AC 521-004,—*Changes to the Type Design of an Aeronautical Product*;
 - (g) Airworthiness Notice (AN) B043—*Conformity Inspection Associated with Appliance Type Certification or Modification/Repair Approval Projects*;
 - (h) Notice of Proposed Amendment (NPA) 2010-021—*Approval of the Type Design or Change to the Type Design of an Aeronautical Product*; and
 - (i) Transport Canada form number 26-0469—*Design Change Approval Application*.

2.2 Cancelled Documents

- (1) As of the effective date of this document, the following document is cancelled:
 - (a) Airworthiness Notice (AN) B031, Issue 01, 1995-12-22—*Annotations of Supplemental Type Certificates and Supplemental Type Approvals by Stamping Procedures*.
- (2) By default, it is understood that the publication of a new issue of a document automatically renders any earlier issues of the same document null and void.

2.3 Definitions and Abbreviations

- (1) The following **definitions** are used in this document:
 - (a) **Aeronautical Product:** an aircraft, aircraft engine, aircraft propeller or aircraft appliance or part, or a component part of any of those things, including any computer system and software (Ref. *Aeronautics Act* and Section 521.01 of the CARs).
 - (b) **Certification Basis:** refers to the applicable standards as established in Section 521.157 of the CARs, as appropriate, including any special conditions—airworthiness (SCA), findings of equivalent level of safety, and exemptions applicable to the product to be certified.
 - (c) **Conformity with the Certification Basis:** demonstrating compliance with all of the applicable standards and requirements of the certification basis.
 - (d) **Delegate:** any person or class of persons authorized under the authority of Subsection 4.3(1) of the *Aeronautics Act* to perform functions on behalf of the Minister, subject to the requirements in Chapter 505 of the *Airworthiness Manual (AWM)*.
 - (e) **Standards of Airworthiness:** design requirements as defined in the AWM. For design changes, the standards of airworthiness may also be listed on the type certificate data sheet (TCDS).
 - (f) **Supplemental Type Certificate (STC):** a document, including a limited supplemental type approval and a supplemental type approval issued before October 10, 1996 under Section 214 of the *Air Regulations* and a limited STC issued before December 1, 2009 under Section 513.11 or 513.22 of the CARs, issued by the Minister to record the approval of a change to the type design of:
 - (i) an aeronautical product identified in the document by a single serial number;
 - (ii) several aeronautical products of the same type or model, approved under a single type certificate and identified in the document by their serial numbers; or
 - (iii) several aeronautical products of differing types or models, approved under separate type certificates and identified in the document.(Ref: Subsection 101.01(1) of the CARs).

Note: *With respect to (iii) above, the type certificates must refer to the same design standard, i.e. AWM Chapter 525 standard cannot be mixed with Chapters 523, 527 or 529 on the same STC.*
 - (g) **Type Design:**
 - (i) the drawings and specifications, and a listing of those drawings and specifications that are necessary to define the design features of an aeronautical product in compliance with the standards applicable to the aeronautical product;
 - (ii) the information on dimensions, materials and manufacturing processes that is necessary to define the structural strength of an aeronautical product;

- (iii) the approved sections of the aircraft flight manual, where required by the applicable standards of airworthiness;
 - (iv) the airworthiness limitations section of the instructions for continued airworthiness specified in the applicable chapters of the AWM; and
 - (v) any other data necessary to allow, by comparison, the determination of the airworthiness and, where applicable, the environmental characteristics of later aeronautical products of the same type or model.
- (Ref: Subsection 101.01(1) of the CARs).

3.0 BACKGROUND

- (1) With the implementation of Subpart 521 of the CARs, new documents have been created to support the regulations. All guidance material such as Staff Instructions (SIs), ACs, and Policy Letters, that supported the previous CARs and Chapters 511, 513, 591 and 593 of the *Airworthiness Manual (AWM)* have been reviewed and the relevant material included in the 521 series ACs and SIs.
- (2) This AC is organized to mirror Sections and the Subsections of Division V of Subpart 521 of the CARs, so that it can be easily read in conjunction with Subpart 521 of the CARs.
- (3) Although Subpart 521 of the CARs introduced a change in terminology in the English version from “compliance” to “conformity” this AC will be using “compliance” wherever possible to minimize confusion in this document.

Note: *In December 2010, a Notice of Proposed Amendment (NPA) to Subpart 521 of the CARs (NPA 2010-021) was introduced to revert the terminology “conform” and “conformity” back to “comply” and “compliance”.*

4.0 OVERVIEW OF THE SUPPLEMENTAL TYPE CERTIFICATE PROCESS

- (1) The requirements that must be fulfilled to obtain an STC as a result of a change to a type design are defined in Divisions IV, *Changes to a Type Design* and V, *Supplemental Type Certificates* of Subpart 521 of the CARs. This AC should be used in conjunction with AC 521-004.
- (2) Section 521.201 of the CARs defines to whom and what this division applies.
- (3) Section 521.203 of the CARs defines the requirements of an applicant for an STC.
- (4) Sections 521.204, 521.205, and 521.157 to 521.160 of the CARs define what actions are required by an applicant for an STC document.
- (5) Sections 521.206 and 521.207 and 521.161 of the CARs define the requirements of the design approval issuance and subsequent revisions.

5.0 PRE-APPLICATION PHASE

5.1 Application — Section 521.201

- (1) Section 521.201 of the CARs applies to applicants and holders of an STC in respect of a design change to an aeronautical product.
- (2) The actions and requirements of the applicant may be undertaken by a person acting as their representative. However, such an arrangement in no way relieves the applicant of their responsibilities to the CARs.

- (3) Any Canadian individual or organization may apply for an STC. Canadian design approval documents are not issued directly to foreign applicants. Refer to Division XI of Subpart 521 of the CARs for more information on foreign applicants.

5.2 Eligibility Requirements — Section 521.202

- (1) Section 521.202 of the CARs requires the applicant to have or have access to the required technical capabilities specific to the design change under consideration. An applicant could meet this requirement by:
 - (a) Having a level of knowledge and capability appropriate for the design change; or
 - (b) Showing that an arrangement exists for the applicant to have access to a level of knowledge and capability appropriate for the design change.
- (2) For more detailed information on how the Minister determines technical capability, refer to AC 521-002.

6.0 PHASE I – APPLICATION AND ESTABLISHING CERTIFICATION BASIS

6.1 Application for a Supplemental Type Certificate — Section 521.203

- (1) The applicant applies for an STC by completing Transport Canada Form, 26-0469, *Design Change Approval Application* (or alternate TCCA accepted form or process).
- (2) The application is to be accompanied by:
 - (a) a design change description, which the change in type design must constitute only one specific change to the type design OR several changes that are interrelated by virtue of the nature of the overall change;
 - (b) a proposed certification basis; and
 - (c) a certification plan as per section 521.155 of the CARs.
- (3) Applicants for an STC may apply for an STC with several aeronautical products of differing types or models approved under separate type certificates within the same AWM Chapter; however they can also limit the application to several aeronautical products of the same type or model, approved under a single type certificate, or to an aeronautical product identified in the document by a single serial number.
- (4) Typically, it would be determined at the time of application when the certification basis is being established, the range of products and serial numbers covered by the STC.
- (5) The broad objective is to have sufficient documentation to demonstrate compliance with the certification basis to obtain the design approval and to provide support for the continued airworthiness and maintenance.
- (6) For additional details of the application process, including submittal procedures, refer to AC 521-004.

6.2 Certification Basis — Section 521.204

- (1) Sections 521.203 and 521.155 of the CARs require the applicant to propose a certification basis for the design change under consideration.
- (2) Sections 521.204 and 521.157 of the CARs require the Minister to establish the certification basis for the design change.
- (3) For additional guidance on the development of the certification basis for a design change, see AC 521-004 and AC 500-016.

7.0 PHASE II – ESTABLISHING MEANS OF COMPLIANCE AND TRANSPORT CANADA CIVIL AVIATION LEVEL OF INVOLVEMENT

- (1) SI 521-004 provides procedural information to TCCA employees and delegates on the process for approving modifications. This document also provides more information on establishing means of compliance and TCCA's level of involvement under Phase II.

8.0 PHASE III – DEMONSTRATE AND RECORD COMPLIANCE**8.1 Compliance with Certification Basis — Section 521.205**

- (1) Section 521.205 of the CARs:
- (a) requires the applicant to comply with Section 521.160 of the CARs in regards to compliance with the certification basis; and
 - (b) defines the effective period of an application for the approval of a change to the type design as per section 521.156 of the CARs.

Note: Section 521.160 of the CARs will point the applicant back to Section 521.44 with respect to Inspections and Tests. More information on Inspections and Tests can be found in AC 521-002.

- (2) In demonstrating compliance with the certification basis, it is the complete changed product, and not just the change itself, that is to be considered.
- (3) The following are examples of some areas that may have been affected by the change. Continued compliance after modification is to be shown where applicable:
- (a) Structural strength (static, strength, hardness, flexibility);
 - (b) Fatigue life;
 - (c) Damage tolerance;
 - (d) Corrosion protection;
 - (e) Noise attenuation;
 - (f) Thermal conductivity;
 - (g) Accessibility for maintenance;
 - (h) Vibration;
 - (i) Colour and reflectance (e.g. ultraviolet absorption, thermal radiation);
 - (j) Process specifications (nitriding, etc.);
 - (k) Surface finish, aerodynamic smoothness;
 - (l) Environmental factors, such as heat, cold, reduced pressure at altitude;
 - (m) Electrical conductivity (lightning strike);
 - (n) Electromagnet interference protection;
 - (o) Flammability protection; and
 - (p) Failure modes and effects analysis.

8.2 Demonstration of Compliance

- (1) Considerations that may be an acceptable means of demonstrating compliance with the associated airworthiness standards should include:

- (a) Conduct all tests, analyses and inspections necessary to demonstrate compliance with the applicable airworthiness standards. Comparative analyses may contribute towards meeting this requirement, but shall not be used alone. Test and computation are examples of means by which an applicant may demonstrate compliance with the applicable airworthiness standards:
 - (i) Test means testing related to the criticality and complexity of the modification. If required, the component testing shall be designed to test the performance and durability of the modification to the extent required by the applicable airworthiness standards. Certification testing (as opposed to developmental testing) include protocols such as conformity inspections of the test article and acceptance of a proposed test plan that should be discussed and agreed to by the regional engineer before proceeding with the testing. The tests must be supported by appropriate analysis and engineering assessment to both the next higher assembly, and the aeronautical product as a whole of the consequences should the modification fail to perform its intended function;
 - (ii) Computation means demonstration by analysis that the design of the modification meets the requirements of all applicable airworthiness standards. This analysis should discuss how the modification meets these requirements and address elements such as material composition, condition, fabrication, configuration, and interface with other parts;
- (b) Ensure that the modification complies with the certification basis, that no interference with mating or adjacent hardware occurs, and that the modified product performs its intended function;
- (c) Demonstrate that the modification can be manufactured and installed on the aeronautical product in compliance with pertinent drawings and/or instructions; and
- (d) Demonstrate that the operating and maintenance instructions, if affected, provide adequate information for safe operation and continuing airworthiness of the changed product.

9.0 PHASE IV – APPROVAL OF A CHANGE TO THE TYPE DESIGN

9.1 Issuance of a Supplemental Type Certificate — Section 521.206

- (1) Section 521.206 of the CARs defines the requirements for the issuance of an STC.
- (2) The applicant must provide an undertaking signed by the intended holder to fulfill the responsibilities of a design approval document holder. More information on this item is provided in AC 521-004.
- (3) The issuance of an STC signifies that the change to the type design is approved by the Minister and the certificate forms part of the changed product's type design, when the design change is incorporated. Where the modification is intended for incorporation in a limited number of products of a type as opposed to all products of a type, the approval document is an STC limited to the serial numbers listed on the document.
- (4) The certificate numbering system shall be specified by TCCA. TCCA is responsible for issuing certificate numbers, including those for delegates.
- (5) It is not permissible to stamp or mark the STC in any way or for any purpose. This applies also in the case where holders may have stamped the STC for control of proprietary data. The marking or stamping of this CAD is not acceptable for this purpose.

10.0 PHASE V – POST CERTIFICATION ACTIVITIES**10.1 Change to a Type Design Approved in a Supplemental Type Certificate — Section 521.207**

- (1) Section 521.207 of the CARs refers the holder of an STC who proposes to make a change to the type design approved in the STC to comply with the requirements in Section 521.152 of the CARs.
- (2) It is not intended that the STC be revised for changes in design or documentation that would be considered “minor”. Changes to the STC that would require an amendment to the certificate may include:
 - (a) updating of supporting technical data; i.e. top drawing list, approved sections of the flight or maintenance manual supplement, etc.

Note: The phrase “or later approved revisions” may be used in conjunction with the documentation referenced on certificates to alleviate the requirement to issue an amended certificate because of revisions associated with supporting documentation.
 - (b) changes in airworthiness limitations originally prescribed;
 - (c) additions, deletions or changes of aeronautical product models or types;
 - (d) cross–reference to other approval certificates having a direct impact on a given approval, etc.; and
 - (e) change of address or transfer of ownership, etc.

11.0 INFORMATION MANAGEMENT

- (1) Not applicable.

12.0 DOCUMENT HISTORY

- (1) Not applicable.

13.0 CONTACT OFFICE

Suggestions for amendment to this document are invited, and should be submitted to:

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Transport Canada documents or intranet pages mentioned in this document are available upon request.