BELIZE

DEPARTMENT OF

CIVIL AVIATION

BELIZE CIVIL AVIATION REGULATIONS CERTIFICATION PROCEDURES FOR AIRCRAFT AND RELATED PRODUCTS AND PARTS BCAR – 21

Issue: 2
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Issue and Revision System

THE REVISIONS TO THIS REGULATION WILL BE INDICATED BY A VERTICAL BAR ON THE LEFT SIDE, IN FRONT OF THE LINE, SECTION OR FIGURE THAT HAS BEEN AFFECTED. AN ISSUE WILL BE THE REPLACEMENT OF THE COMPLETE DOCUMENT.

THESE REVISIONS MUST BE RECORDED ON THE RECORD OF REVISIONS TABLE OF THIS DOCUMENT, INDICATING THE RESPECTIVE NUMBER, DATE IT WAS ENTERED AND SIGNED BY THE PERSON ENTERING THE REVISION.

Record of Revisions

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Preamble

BCAR 21 Issue 2 is in compliance with ICAO Annex 8 amendment 100.

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SECTION 2

Subpart A - General

BCAR 21.1 Purpose

a) This Part details requirements governing the issue of a Type Acceptance Certificate, Certificate of airworthiness and Permit to Fly and Export Certificate of airworthiness. It also covers the requirements for the issue of documents for the design, certification, modification and repair of aircraft, aircraft engines, propellers, components, and appliances to permit their use in aircraft registered in the Belize and including documentation for the export of such aircraft.

b) The rules governing the holders of any specific certificate mentioned in para (a)

c) The requirements for the approval of certain materials, parts, processing and disposal.

d) The requirements for the classification, approval and documentation of major repairs and modification in aircraft, aircraft components, engines and propellers.

Section 21.2 Definitions and Terminologies

a) **In this Regulation;**

Aeroplane: means a power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Aircraft: means any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Airworthiness directive (AD). A regulatory document which identifies aeronautical products in which an unsafe condition exists and where the "unsafe" condition is likely to exist or develop in other products of the same type design. It prescribes corrective actions to be taken or the conditions or limitations under which the products may continue to be operated. The AD is the common form of mandatory continuing airworthiness information mentioned in Annex 8.

Approved: means accepted by the contracting state

Appropriate Airworthiness Requirements: means the comprehensive and detailed airworthiness codes established, adopted or accepted by a contracting state for the class of aircraft, engine or propeller under consideration (see ICAO 3.22 of Part II of Annex 8.)

BDCA: means Belize Department of Civil Aviation

Class I product: A complete aircraft, aircraft engine or propeller which has been type certificated in accordance with the appropriate airworthiness requirements for which the necessary Type Certificate Data Sheet or equivalent have been issued.

Class II Product: A major component of a Class I products, such as wing, fuselage, empennage surface etc, the failure would jeopardize the safety of the Class 1 product or any part, material or system thereof.

Class III Product: Any part or component which is not a Class I or Class II product or a standard part.

DOA: mean Design Organization Approval

Helicopter: means a heavier than air aircraft supported in flight chiefly by the reactions of the air on one or more power driven rotors on substantially vertical axis.

Human Factors: Principles means principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance

Human Performance: means Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

Maintenance: means the performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair.

Modification: means the alteration of an aircraft/aircraft component in conformity with an approved standard.

Repair: means the restoration of an aeronautical product to an airworthy condition to ensure that the aircraft continues to comply with the design aspects of the appropriate airworthiness requirements used for the issuance of the type certificate for the respective aircraft type, after it has been damaged or subjected to wear.

State of Design: means the state having jurisdiction over the organization responsible for the type design.

State of manufacture: means the state having jurisdiction over the organization responsible for the final assembly of the aircraft

State of Registry: means the state on whose register the aircraft is entered.

Type Certificate: means a document issued by a contracting state to define the design of aircraft type and to certify that this design meets the appropriate airworthiness requirements of that state,

BCAR 21.3 Notification of Failures, Malfunctions and Defects.

a) Aircraft owners and operators will ensure to transmit to the State of Design, State of Registry and a copy to the State of Operator when different from the State of Registry or State of Design, in a Form BDCA 1030 of an aircraft the failures, malfunctions, defects and other occurrences that have or may have an adverse effect as listed in paragraph (c) of this BCAR

b) The BDCA shall ensure to transmit to the State of Design of a product of any failures, malfunctions defects and other occurrences that have or may have an adverse effect as listed in paragraph (c) of this BCAR.

c) The following failures, malfunctions or defects shall be reported:

1. Fires during flight and whether the related fire warning system properly operated;

2. Fires during flight not protected by a related fire warning systems;

3. False fire warning during flight;

4. An engine exhausts system that causes damage during flight to the engine, adjacent structure, equipment, or components;

5. An aircraft component that causes accumulation or circulation of smoke,

vapour or toxic or noxious fumes in the crew compartment or passenger cabin during flight;

6. engine shutdown during flight because of flameout;

7. engine shutdown during flight when external damage to the engine or aircraft structure occurs;

8. engine shutdown during flight due to foreign object ingestion or icing; shutdown during flight of more than one engine;

9. a propeller feathering malfunction or inability of the system to control overspeed during flight;

10. a fuel or fuel-dumping system malfunction that affects fuel flow or causes hazardous leakage during flight;

11. an uncommanded landing gear extension or retraction or opening or closing of landing gear doors during flight;

12. brake system components malfunction that result in loss of brake actuating force when the aircraft is in motion on the ground;

13. aircraft structure damage that requires major repair;

14. failure or malfunction of any flight control system, flap, slat or spoiler

15. any excessive unscheduled removals of essential equipment on account of defects;

16. cracks, permanent deformation, or corrosion of aircraft structure, if more than the maximum acceptable to the manufacturer or the Authority;

17. aircraft components or systems malfunctions that result in taking emergency actions during flight, except action to shut down an engine;

18. emergency evacuation systems or components including all exit doors, passenger emergency evacuating lighting Equipment that are found defective or that fail to perform the intended functions during an actual emergency or during training, testing, maintenance, demonstration or inadvertent deployments;

19. each interruption to a flight, unscheduled change of aircraft en route or unscheduled stop or diversion from a route, caused by known or suspected technical difficulties or malfunctions;

20. any abnormal vibration or buffeting caused by a structural or system malfunction, defect or failure;

21. a failure or malfunction of more than one attitude, airspeed or altitude instrument during a given operation of the aircraft;

22. the number of engines removed prematurely because of malfunction, failure or defect, listed by make and model and the aircraft type in which it was installed; or

23. the number of propeller featherings in flight, listed by type of propeller and engine and aircraft on which it was installed

d) The written report required by this Regulation shall:

1) Be made within the following 24 hours after determining that the failure, malfunction, or defect required to be reported has occurred; and

2) Include as much of the following information as is available and applicable:

i. Type and registration mark of aircraft.

ii. Name of operator.

iii. Aircraft serial number.

iv. Where the failure, malfunction or defect is associated with an article approved under a technical standard order (TSO) authorization, the article serial number and model designation, as appropriate.

v. where the failure, malfunction or defect is associated with an engine

vi. or propeller, the engine or propeller serial number, as appropriate;

vii. product model;

viii. identification of the part, component, or system involved, including the part number; and

ix. the nature of the failure, malfunction or defect..

e) The BDCA upon receipt of the report specified in para (d) for aircraft registered in Belize, shall submit the reports to the state of design

f) The BDCA upon receipt of the report specified in para (d) for foreign registered aircraft operating in Belize, shall submit all such reports to the state of registry and the state of design

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SUBPART B TYPE CERTIFICATE

BCAR 21.9 Purpose

a) This Subpart establishes the procedures for issuing type-certificate for products and restricted type-certificates for aircraft and establishes the rights and obligations of the applicant for, and holders of, those certificates.

BCAR 21.11 Acceptance of the Foreign Type Certificates.

a) The BDCA will accept the Type Design that has been approved by the Federal Aviation Administration (FAA) of The United States, Transport Canada, a Full Member State of the Joint Aviation Authorities (JAA) or the European Aviation Safety Agency (EASA) by the issue of a Type Certificate or an equivalent document;

b) The acceptance of a type certificate as established in paragraph (a) shall comply with airworthiness code without exceptions or deviations.

c) All aircraft including its engines and propeller must obtain an individual certificate of airworthiness, for which its type certificate should have been approved under standards of the State of Design in accordance with paragraph (a) including the exceptions to the type certificate that the issuing authority have imposed.

d) For the importation and operation of the mentioned products in paragraph (a), the importers shall show proof that they have all adequate technical support in regards to airworthiness maintenance (ADs, Service bulletins, design support a spares), in addition a flight manual for the aircraft operation.

BCAR 21.19 Changes requiring a new type-certificate

a) Any person who proposing to change a product must apply for a new type certificate if the BDCA finds that the change in design, power, thrust, or weight is so extensive that a substantially complete investigation of compliance with the applicable regulations is required.

BCAR 21.31 Type Design and Type Certificate

a) The type design shall consist of:

1) The drawings and specifications, and a listing of those drawings and specifications, necessary to define the configuration and the design features of the product shown to comply with this BCAR 21 and with the applicable type-certification basis and environmental protection.

2) Information on dimensions, materials and processes necessary to define the strength of the product.

3) An approved airworthiness limitation section of the instructions for continued airworthiness as defined by the applicable airworthiness code; and,

4) Any other data necessary to allow by comparison, the determination of the airworthiness, the characteristics of noise, fuel venting, and exhaust emission)where applicable) of later products of the same type

b) Each type design shall be adequately identified.

BCAR 21.49 Availability

a) The holder of a type certificate shall make the certificate available for examination upon the request of the BDCA.

BCAR 21.61 Instructions for Continued Airworthiness

a) The holder of the type certificate or restricted type certificate shall furnish at least one set of instructions for continued airworthiness (manual, limitation date and bulletins) comprising descriptive data and accomplishment instructions prepared in accordance with the applicable requirements for type certificates, supplemental type certificates for such products.

b) In addition changes to the instructions for continued airworthiness shall be made available to all known operators of the product and shall be made available on request to any person required to comply with any of those instructions. A program showing how changes to the instructions for continued airworthiness are distributed shall be submitted to the BDCA.

BCAR 21.63 Relative Airworthiness Maintenance Data

a) The BDCA shall ensure that, when an aircraft first enters its registry and issues a Certificate of Airworthiness, it will advise the state of design that such aircraft has been entered in the Belizean registry.

b) The BDCA upon receipt of mandatory continuing airworthiness information from the state of design, adopt the mandatory information directly or assess the information received and take proper action in accordance with BCAR 39.10 and

c) Ensure the transmission to the state of design of all mandatory continuing airworthiness information which is, as the state of registry, originated in respect of that aircraft.

SUBPART D – CHANGES TO TYPE CERTIFICATE

BCAR 21.90 Applicability

a) This subpart establishes the procedure for the approval of changes to type designs and type certificates, and establishes the rights and obligations of the applicant for, and holders of, those approvals. In this Subpart, references to type-certificate include type-certificate and restricted type-certificate.

BCAR 21.91 Classification in Changes in Type Design (See AMC 21.91)

a) Changes in type design are classified as minor and major. A “minor change” is one that has no appreciable effect on the mass, balance, structural strength, reliability, operational characteristics or other characteristics affecting the airworthiness of the product. All other changes are “Major Overhaul”. All changes (major or minor) must be approved in accordance with BCAR 21.95 or BCAR 21.97 as appropriate.

BCAR 21.95 Approval of Minor changes in Type Design

a) Minor changes in a type design shall be classified and approved either:

   (i) The BDCA,

   (ii) By an appropriately approved design organization under a procedure agreed with by the BDCA

BCAR 21.97 Approval of Major Changes in type Design

a) The approval for major changes in design or type certificate shall be negotiated with the states that issue the approval for the design type through the mechanisms and requirements established by these states.

b) The approved changes shall be submitted to the BDCA for records in Form BDCA Form 337.

BCAR 21.99 Required Design Changes

a) Where it has been determined that a product design change may be required to correct an unsafe condition, the BDCA shall notify the State of Type Design.

b) If it is determined by the Authority of the State of Type Design that a design change is necessary to correct the unsafe condition of the product, the report furnished by the State of Type Design to correct the unsafe condition shall be complied with to maintain the validity of the certificate of airworthiness.

c) Upon approval of the design change by the State of Type Design, the BDCA shall promulgate the descriptive data covering the change to all operators of the product on his register.

d) If it is found through service experience that changes to the Type Certificate or the Type Acceptance Certificate will contribute to the safety of the product, the BDCA shall notify the State of Type Design for the product; and

   1) shall upon receipt of an associated report from the State of Type Design make any appropriate changes to the Type Acceptance Certificate; and

   2) Upon approval of the design change by the State of Type Design, the Governor shall promulgate the descriptive data covering the change to all operators of the product on his register.

BCAR 21.105 Record Keeping

a) All relevant design information, drawings and test reports, including inspection records for the product tested shall be held by the type certificate holder at the disposal of the BDCA and shall be retained in order to provide the information necessary to ensure the continued airworthiness and compliance with applicable environmental protection requirements of the product.

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SUBPART E – SUPPLEMENTAL TYPE CERTIFICATE

BCAR 21.111 Applicability

a) This Subpart establishes the procedure for the approval of major changes under supplemental type certificate procedures, and establishes the rights and obligations of the applicants for, and holders of those certificates.

BCAR 21.113 Requirement of Supplemental Type Certificate

a) In accordance with BCAR 21.97 the major changes to the design type of a product shall apply to the Authority of the State of Design for a Supplemental Type Certificate.

b) The application for a Supplemental Type Certificate shall be made in a manner established by the issuing State of the Type Design Approval through the mechanisms and requirements established by such States.

c) Those changes whose installation constitutes of a major change to the type certificate requires to be negotiated through a supplemental type certificate as established by this BCARs

d) The major changes to the products sustained in the supplemental type certificate should be presented in the supplemental type certificate should be presented to the BDCA previous to the incorporation to the product.

e) The BDCA will accept major changes that are sustained in the acceptable data when these have been developed by an approved design organization.

BCAR 21.118 Instructions for Continued Airworthiness

a) The holder of the type certificate or restricted type certificate shall furnish at least one set of instructions for continued airworthiness (manual, limitation date and bulletins) comprising descriptive data and accomplishment instructions prepared in accordance with the applicable requirements for type certificates, supplemental type certificates for such products.

b) In addition changes to the instructions for continued airworthiness shall be made available to all known operators of the product and shall be made available on request to any person required to comply with any of those instructions. A program showing how changes to the instructions for continued airworthiness are distributed shall be submitted to the BDCA.

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SUBPART H – CERTIFICATE OF AIRWORTHINESS

BCAR 21.171 Scope

a) This subpart establishes procedure for issuing a Certificate of airworthiness.

BCAR 21.173 Eligibility

a) Any registered owner of a Belize registered aircraft may apply for a Certificate of airworthiness for that aircraft. An application for a Certificate of airworthiness must be made in a form and manner prescribed by this regulation.

BCAR 21.174 Languages

a) The manuals, placards, listings and instrument markings and other necessary information required by the BCARs should be presented in the official Belizean language.

BCAR 21.175 Classification Certificate of airworthiness

a) Certificate of airworthiness shall be classified as follow:

1) Standard certificate of airworthiness shall be issue to aircraft which conform to a type certificate that has been issued in accordance with this Subpart.

b) Special certificate of airworthiness shall be issued to aircraft:

1) Which conform to a restricted type certificate that has been issued in accordance with this Subpart; or

2) Which have been shown to the BDCA to comply with specific certification specifications ensuring adequate safety.

BCAR 21.177 Amendment or modification

a) A Certificate of airworthiness may be amended or modified only by the BDCA.

BCAR 21.179 Transferability

a) Where ownership of an aircraft has changed:

1) If it remains on the same register, the certificate of airworthiness or the restricted certificate of airworthiness conforming to a restricted type certificate only, shall be transferred together with the aircraft

BCAR 21.181 Duration and Continued Validity

a) The BDCA can suspend, revoke or establish a cancellation date for the Certificate of airworthiness. Unless it is suspended, revoked or cancelled, the Certificate of airworthiness is valid as specified below:

(1) Once the maintenance preventive maintenance and alteration is carried out in accordance with the BCARs requirements and the aircraft is registered in accordance with BCAR 45

(2) A valid special flight permit specified in the certificate.

(3) A restricted Certificate of airworthiness for experimental aircraft, with the sole purpose of investigation and development, shall comply with the applicable BCAR requirements, as well as

training for the crew and shall have a validity period as agreed by the BDCA.

(4) The owner, operator shall have the aircraft available for inspection when required by the BDCA.

(5) When a Certificate of airworthiness have been suspended, revoked or cancelled, the owner, operator shall return such certificate (if it is required) to the BDCA.

(6) The Certificate of airworthiness is considered invalid when the type certificate under which that aircraft was designed is suspended or revoked by the state that issued such type certificate.

b) When a Certificate of Airworthiness is suspended, revoked or cancelled, the owner, operator shall return such certificate within three day (03 days) after the date of suspension or cancellation.

c) The validity of a Certificate of airworthiness will become invalid if the charges as defined by the BDCA are not paid.

d) A Certificate of airworthiness or restricted certificate of airworthiness issued under this Subpart is valid for 12 months from the date of issue unless:

1) A shorter period is specified by the BDCA.

2) The BDCA amends, extends, suspends, revokes or otherwise terminates the certificate

3) The aircraft owner or operator surrenders the certificate to the BDCA

BCAR 21.182 Aircraft Identification

a) An applicant for a certificate of airworthiness or special flight permit under this part shall show that the aircraft is properly registered and marked and has identification plates affixed to the aircraft in accordance with BCAR 45.11

BCAR 21.183 Issue of Certificate of airworthiness

a) An applicant is entitled to a certificate of airworthiness for an aircraft if:

1) the applicant meets the applicable requirements of this Subpart in a manner acceptable to the Director; and

2) the granting of the certificate is not contrary to the interests of aviation safety; and

3) a recommendation for issue of a certificate is made by an authorised person to the Director; and

4) any applicable fee has been paid.

BCAR 21.185 Certificate of airworthiness

a) A Certificate of Airworthiness shall be issued by the Director when satisfied that the applicant has demonstrated that the aircraft complies with the relevant Type Acceptance Certificate.

b) Each applicant for the issue of a certificate of airworthiness for an aircraft shall provide acceptable evidence to the Director that:

1) a Type Acceptance Certificate has been issued for the aircraft under Subpart B; and

2) the aircraft conforms to an applicable Type Acceptance Certificate issued under Subpart B;

3) each modification and repair to the aircraft conforms to design changes as required by BCAR 21 Subpart C; and

4) the aircraft complies with any applicable airworthiness directives required to be complied with under BCAR 39; and

5) the aircraft is issued with the appropriate flight manual that is current for the type and model; and

6) the aircraft records are complete and up to date and are recorded in the aircraft log books or any equivalent media acceptable to the Director; and

7) a valid Export Certificate of Airworthiness or equivalent document has been issued by a State of Registry identified in BCAR 21.11; and

8) the aircraft is appropriately registered and displays nationality and registration marks in accordance with BCAR 45; and

9) the aircraft, its engines, propellers, and propeller hubs and blades are identified by the means specified in the Type Design standards or acceptable to the Director; and

10) the aircraft has undergone a maintenance inspection acceptable to the Governor that is based on:

    i. a routine inspection in accordance with the manufacturer's maintenance programme; or

    ii. a scheduled inspection in accordance with the maintenance programme of an air transport operator certified by an ICAO contracting State; or

    iii. an equivalent inspection acceptable to the Director; and

11) the aircraft has been weighed in accordance with the intervals specified in BCAR OPS 1 Subpart J in its current configuration prior to application; and

12) the aircraft is in an airworthy condition; and

13) a certificate of release to service has been issued; and

14) an acceptable flight check has been performed

BCAR 21.199 Issue of ferry flight authorization

a) The application for a ferry flight shall be made in a manner as established by the BDCA indicating at least the following:

    1) The name and address of the registered owner of the aircraft

    2) The make, model, serial number and registration marks of the aircraft

    3) Purpose of the flight

    4) The proposed itinerary

    5) Crew and equipment required to conduct such fight (pilot, co-pilot, engineer)

    6) Details of non-compliance with

applicable airworthiness requirements

7) Whatever restriction the applicant sees

8) necessary for the safe operation of that aircraft

9) Any other information considered necessary by the BDCA for the safe operation of that aircraft.

b) The BDCA has the authority to realize and order the applicant of a ferry flight, to conduct the inspections and tests necessary to verify the safety operation of the aircraft.

c) The validity of a ferry flight is specified in the application.

d) If the flight involves operations over states other than the state of registry, the operator of the aircraft must obtain authorization from the appropriate authorities of those states prior to undertaking the flight.

BCAR 21.211 Certificate of release to service (components)

a) A certificate of release to service will be issued through a BDCA Form 1. The purpose of the certificate is to identify airworthiness and eligibility status of those products which are not aircraft (engine, propeller, component)

BCAR 21.213 Certificate of release to service for aircraft

a) A certificate of release to service will be issued in accordance with BCAR 145.50, and issued by the BCAR 145 approved maintenance organization for the aircraft which have underwent Inspections and/or repairs modifications in accordance with an approved maintenance program.

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SUBPART J – DESIGN ORGANIZATION APPROVAL- FOR MODIFICATIONS AND REPAIR OF PRODUCT, COMPONENTS AND PARTS (TO BE DEVELOPED)

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SUBPART K – APPROVAL OF PARTS AND COMPONENTS FOR INSTALLATION/REPAIR

BCAR 21.301 Purpose

a) This Subpart details requirements for the acceptance of materials, parts and appliances.

BCAR 21.303 Replacement and modification of materials, parts, and appliances

a) A replacement or modification of a material, part or appliance to be installed into a type accepted product shall:

1) be supported by an authorised release certificate issued by an organisation approved by the BDCA in accordance with BCAR 21.11; and

2) conform to the certification standards of the applicable type acceptance certificate.

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SUBPART L – ISSUANCE OF EXPORT CERTIFICATE OF AIRWORTHINESS FOR AERONAUTICAL PRODUCTS

BCAR 21.321 Export Certificate of airworthiness

a) An owner of an aircraft registered in Belize or an agent of the owner may apply to the BDCA for issue of an export certificate of airworthiness for that aircraft.

b) An application for an export certificate of airworthiness shall be made on a form prescribed by the BDCA at least 14 days before the intended date of export of the aircraft out of Belize.

c) The BDCA shall issue an export certificate of airworthiness if:

1) the applicant submits a statement of compliance with the full intents of the approved maintenance programme or schedule;

2) the applicant submits a statement of compliance with the mandatory airworthiness directives and service bulletins applicable to the aircraft and its equipment;

3) the aircraft has been inspected in accordance with the performance rules of these Regulations and found airworthy by persons authorised by the BDCA to make such determination within the last 14 days;

4) the maintenance determined by the BDCA as a prerequisite for issue of the export certificate of airworthiness has been carried out and certified by a person acceptable to the BDCA in accordance with these Regulations;

5) the result of test flight, and such other tests as the BDCA may determine are complied with;

6) historical records establish the production, modification and maintenance standard of the aircraft; and

7) a weight and balance report with a loading schedule, where applicable, for each aircraft in accordance with the applicable regulations is furnished to the BDCA.

d) An export certificate of airworthiness shall not be used for the purpose of flight but for confirmation of recent satisfactory review of the airworthiness status of the aircraft.

e) Any extension or variation granted to an aircraft in accordance with an approved maintenance programme or schedule shall be automatically revoked before issue of the export certificate

SUBPART M - REPAIRS

BCAR 21.431 Applicability

a) This subpart establishes the requirements for the approval carried out on products, parts and components

b) A "repair" means the elimination of damage/or restoration to an airworthy condition following initial release into service by the manufacturer of any product, part or component. Elimination of damage by replacement of product, parts or component without the necessity for design activity shall be considered as a maintenance task and shall therefore require no approval under this subpart.

BCAR 21.433 Repair Design
{See AMC 21.433(a)}

a) The applicant for approval of a repair design shall

1) Show compliance with the requirements incorporated by reference in the type certificate or supplemental type certificate as applicable, or those in effect on the date of application (for repair design approval), plus any amendments to those certification specifications or special conditions the BDCA finds necessary to establish a level of safety equal to that established by the type certification basis incorporated by reference in the type certificate or supplemental type certificate.

2) Submit all necessary substantiation data, when requested by the BDCA.

3) Declare compliance with the requirements of (a),(1) of this paragraph

b) When the applicant is not the type certificate or supplemental type certificate holder, as applicable, the applicant may comply with the requirements of paragraph (a) through the use of its own resources or through an arrangement with the type certificate or supplemental type certificate holder, as applicable

c) Any repair carried out under approved technical data, that is, structural repair manual, SBs or any other approved document do not need to be submitted to the BDCA for approval.

BCAR 21.435 Classification of Repairs
{See AMC 21.435(a)}

a) A repair may be "major" or "minor". The classification shall be made in accordance with the criteria of BCAR 21.191 for a change in the type design.

b) A repair shall be classified as "major" or "minor" under paragraph (a) either:

1) By the BDCA,

2) By an appropriate approved design organization under a procedure agreed with the BDCA

BCAR 21.437 Issue of a Repair Design Approval (See AMC 21.437 (a) and 21.437 (b))

a) When it has been declared and has been shown that the repair design meets the applicable certification specifications requirements of BCAR 21.433(a) (1), it shall be approved:

(1) By the BDCA, (See 21.437 (a) or

(2) By an appropriately approved organization that is also the type certificate or the supplemental type certificate holder, under a procedure agreed with the BDCA, or

(3) For minor repairs only, by an appropriately approved organization under a procedure agreed with the BDCA

BCAR 21.443 Limitations
(See AMC 21.443)

a) A repair design may be approved subject to the limitations, in which case the repair design approval shall include all necessary instructions and limitations. These instructions and limitations shall be transmitted by the repairs design approval holder to the operator in accordance with a procedure agreed with the BDCA.

BCAR 21.445 Unrepaired Damage
(See AMC 21.445)

a) When a damaged product, part or component, is left unrepaired, and is not covered by previously approved data, the evaluation of the damage for its airworthiness consequences may be made by the BDCA or by an appropriately approved design organization under a procedure agreed with the BDCA. Any necessary limitations shall be processed in accordance with the procedures of BCAR 21.443.

b) Where the organization evaluating the damage is neither the BDCA nor the type certificate or supplemental type certificate holder, this organization shall justify that the information on which the evaluation is based is adequate either from its organization's own resources or through an arrangement with the type certificate or supplemental type certificate holder, or manufacturer, as applicable.

BCAR 21.447 Record keeping

a) For each repair, all relevant design information, drawings, test reports, instructions and limitations possibly issued in accordance with BCAR 21.443, justification for classification and evidence of the design approval shall

1) be held by the repair design approval holder at the disposal of the BDCA, and

2) be retained by the repair design approval holder in order to provide the information necessary to ensure the continued airworthiness of the repaired products, parts or components.

BCAR 21.449 Instructions for Continued Airworthiness

a) The holder of a repair design approval shall furnish at least one complete set of those changes to the instructions for continued airworthiness which result from the design of the repair, comprising

descriptive data and accomplishment instructions prepared in accordance with the applicable requirements to each operator of aircraft incorporating the repair. The repaired product, part or component may be released into service before the changes to those instructions have been completed, but this shall be for a limited period of (3) three days. Those changes to the instructions shall be made available on request to any other person required by the BCARs to comply with any of the terms of those changes to the instructions.

b) If updates to those changes to the instructions for continued airworthiness are issued by the holder of the repair design approval after the repair has been approved, these updates shall be furnished to each operator and shall be made available on request to any other person required by the BCARs to comply with any of the terms of those changes to the instructions.

BCAR 21.451 Obligations

a) Each holder of a major design approval shall undertake the obligations:

1) Laid down in BCAR 21.3, 21.443, 21.447 and 21.449

2) Implicit in the collaboration with the type certificate or supplemental type certificate holder, or both under BCAR 21.433 (b), as appropriate.

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SUBPART O – TSO AND JTSO

BCAR 21.601 Technical standing orders (TSO/JTSO)

a) A Technical Standing Order (TSO/JT) or equivalent is accepted as minimum standards for specific products such as materials, parts, or components used in aircraft and whose authorization has been issued in accordance with BCAR 21.11

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SUBPART Q – IDENTIFICATION OF PRODUCT, PART AND COMPONENTBCAR 21.801

Purpose

a) This Subpart details requirements governing the identification of:

1) aircraft, aircraft engines and propellers; and

2) critical parts; and

3) certain replacement and modification parts:

BCAR 21.803 Removal, alteration and replacement of identification information

a) Except as provided in paragraph 21.803(b) a person shall not, without the approval of the Director, remove, alter or replace on any product or part the following identification information:

1) the manufacturer's name; or

2) the model designation; or

3) the manufacturer's serial number; or
4) where applicable, the Type Certificate or Type Acceptance Certificate number; or

5) where applicable, the manufacturing certificate number or foreign equivalent; or

6) for aircraft engines, the established rating; or

7) any other information required by the Director as a condition of type acceptance
.

b) A person performing maintenance in accordance with BCAR 43 may remove, alter or replace the identification information described in paragraph 21.803(a) if:

1) the certification standards identified on the Type Acceptance Certificate for the product are complied with; and

2) it is removed, altered or replaced in accordance with methods, techniques and practices acceptable to the Director.

SECTION 2

SECTION 2

SUBPART D – CHANGES TO TYPE CERTIFICATE

AMC 21.91 Establishment of the type-certification basis of Changed Aeronautical Products

1. PURPOSE

1.1 This AMC provides guidance for establishing the type-certification basis for changed aeronautical products and identifying the conditions under which it will be necessary to apply for a new type certificate. BCAR 21.91 identifies the conditions under which an applicant for a design change is required to make application for a new type-certificate.

1.2 It provides guidance as to the assessment of "significant" vs. "not significant" changes to the type-certificated product. This document also provides guidance for the determination of "substantial" vs. "significant" changes.

2. APPLICABILITY

2.1 This AMC is applicable to all major changes to type design of aircraft, engines and propellers. For the purposes of this AMC an application for a change to a type-certificate (type design) is considered as an application for a major change. Minor changes as defined in BCAR 21.91 are considered to have no appreciable effect on airworthiness and are therefore by definition not significant. This AMC applies equally to applications made for type-certificates amendments, supplemental type-certificates, or amended supplemental type-certificates.

2.2 This AMC is also applicable to all significant changes to aircraft (other than rotorcraft) of 2722 kg (6,000 lbs.) or less maximum weight, or to a non-turbine rotorcraft of 1361 kg (3,000 lbs.) or less maximum weight. Unless the BDCA finds the change significant in an area, an applicant may show that the changed product complies with the requirements incorporated in the type-certificate

3. EXPLANATION OF TERMINOLOGY

3.1 The following is a summary of the terminology used throughout this advisory or guidance material. Further explanations of some of these terms can be found in paragraphs 5, 6, 7, and 8.

3.2 Type-certification basis: the applicable airworthiness codes under which the type certificate was issued, as appropriate, special conditions, equivalent level of safety findings; and exemptions applicable to the product to be certificated.

3.3 Earlier requirements: the requirements in effect prior to the date of application for the change, but not prior to the existing type-certification basis.

3.4 Existing type-certification basis: the requirements incorporated by reference in the type-certificate of the product to be changed.

3.5 Latest requirements: the requirements in effect on the date of application for the change.

3.6 Previous relevant design changes: previous design changes, the cumulative effect of which could result in a product significantly or substantially different from the original product or model, when considered from the last time the latest requirements were applied.

3.7 Product level change: a change or combination of changes that makes the product distinct from other models of the product (e.g., range, payload, speed). Product level change is defined at the aircraft, engine or propeller level of change.

3.8 Significant change: a product level changes to the type-certificate to the extent that it changes one or more of the following: general configuration; principles of construction; or the assumptions used for the certification criteria, but not to the extent to be considered a substantial change. Not all product level changes are significant.

3.9 Substantial change: a product level design change which is so extensive that a substantially complete investigation of compliance with the applicable requirements is required, and consequently a new type-certificate, in accordance with BCAR 21.19.

4. CLASSIFICATION OF CHANGES

4.1 Included are a series of tables of typical changes for small aeroplanes (Table 1), large aeroplanes (Table 2), rotorcraft (Table 3), and engines/propellers (Table 4) that meet the definition of a significant change or substantial change for each product line. Also includes typical changes that do not achieve the significant level.

4.2 The examples in the tables were developed from data collected from regulatory files and included industry review and input. They clearly are changes that we have seen in the past and will likely continue to see in the future. The Agency has made the determination, based on applying the automatic criteria, that these changes are significant or not significant.

4.3 The columns “Change to General Configuration”, “Change to Principles of Construction” and “Assumptions of Certification” The “Notes” column provides typical rationales that are considered in evaluating the designation of the criteria.

4.4 The tables may be used in one of two ways:

i) to classify a proposed change that is listed in the table, or
ii) in conjunction with the three automatic criteria, to understand the logic used in the table to help classify a proposed change not in the table.

4.5 The classification may change due to cumulative effects and/or combinations of individual changes.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of substantial changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Change in wing location (tandem, forward, canard, high/low)	Yes	No	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required
Fixed wing to tilt wing	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Increase in the number of engines from one to two	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Replacement of piston or turbo-prop engines with turbojet or turbofan engines	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required
Change in engine configuration (tractor to pusher)	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.

The following are examples of substantial changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Change from an all metal airplane to all composite primary structure (fuselage, wing, and empennage).	No	Yes	No	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Increase from subsonic to supersonic flight regime	Yes	No	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Conventional tail to T-tail or Y-tail, or vice versa	Yes	No	Yes	Change in general configuration. Requires extensive structural, flying qualities and performance re-investigation. Requires new AFM to address performance and flight characteristics.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Changes in wing configuration (addition of tail strakes or change in dihedral, or changes in wing span, flap or aileron span, angle of incidence of the tail, addition of winglets, or wing sweep of more than 10%	Yes	No	Yes	Change in general configuration . Likely requires extensive changes to wing structure. Requires new AFM to address performance and flight characteristics. Note: Small changes to wingtip are not significant changes. See table for not significant changes
Tricycle / tailwheel undercarriage change or addition of floats	Yes	No	No	Change in general configuration. Likely, at airplane level, general configuration and certification assumptions remain valid
Increase in seating capacity resulting in a different certification category (e.g., from normal to commuter category where configuration or principles of construction changes or assumptions do not remain valid.	Yes	Yes	Yes	Change in general configuration. Change in principles of construction. Requires extensive construction reassessment. Change in certification assumptions. Requires new AFM and pilot type rating

Table 1. Table of examples of changes for small aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Passenger to freighter configuration conversion which involves the introduction of a cargo door or an increase in floor loading of more than 20%, or provision for carriage of passengers and freight together	Yes	No	Yes	Change in general configuration affecting load paths, aeroelastic characteristics, aircraft related systems, etc. . Change in design assumptions.
A fuselage stretch would be considered significant if it would invalidate the existing substantiation, or would change the primary structure, aerodynamics, or operating envelope sufficiently to invalidate the assumptions of certification	Yes	No	Yes	Likely extensive changes to fuselage structure, aerodynamics, aircraft systems performance, and operating envelope. Requires new AFM to address performance and flight characteristics.
Replace reciprocating engines with the same number of turbo-propeller engines where the operating envelope is expanded	No	No	Yes	Invalidates certification assumptions. Requires new AFM to address performance and flight characteristics.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Addition of a turbocharger that changes the power envelope, operating range, or limitations appreciably.	No	No	Yes	Invalidates certification assumptions due to changes in operating envelope and limitations. Requires new AFM to address performance and flight characteristics
The replacement of an engine of higher rated power or increase thrust would be considered significant if it would invalidate the existing substantiation, or would change the primary structure, aerodynamics, or operating envelope sufficiently to invalidate the assumptions of certification	No	Yes	Yes	Invalidates certification assumptions. Requires new AFM to address performance and flight characteristics. Likely changes to primary structure. Requires extensive construction reinvestigation
A change in the type of material, such as composites in place of metal (or one composite fibre material system with another (e.g., carbon for fibreglass), for primary structure would normally be assessed as a significant change	No	Yes	Yes	Change in principles of construction and design from conventional practices . Likely change in design/certification assumptions.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Change involving appreciable increase in design speeds Vd, Vmo, Vc, or Va	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics
STOL kit	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics
A change in the rated power or thrust is likely to be regarded as significant if the design speeds are thereby changed so that compliance needs to be rejustified with a majority of requirements	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics
Fuel state: such as compressed gaseous fuels, or fuel cells. This could completely alter the fuel storage and handling systems and possibly affect the aeroplane structure.	No	No	Yes	Changes in design/certification assumptions. Extensive alteration of fuel storage and handling systems

Table 1. Table of examples of changes for small aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
A design change that alters the aircraft flight characteristics or performance from the type design would normally be significant if it appreciably changes the kinematics or dynamics of the aeroplane.	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics.
Weight increase which places the aircraft into the commuter category (i.e., above 12500 lbs.)	No	No	Yes	Certification assumptions invalidated. Requires new AFM.
A change in the flight control concept for an aircraft, for example to fly by wire (FBW) and side-stick control, or a change from hydraulic to electronically actuated flight controls, would in isolation normally be regarded as a significant change.	No	No	Yes	Changes in design and certification assumptions. Requires extensive systems architecture and integration reinvestigation. Requires new AFM.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Addition of cabin pressurisation	No	Yes	Yes	Extensive airframe changes affecting load paths, fatigue evaluation, aero elastic characteristics, etc. Requires extensive construction reinvestigation. Invalidates design assumptions.
Changes in types and number of emergency exits or an increase in passenger capacity in excess of maximum passenger capacity demonstrated for the aircraft type.	No	No	Yes	Emergency egress requirements exceed those previously substantiated. Invalidates assumptions of certification.
A change in the required number of flight crew, which necessitates a complete cockpit rearrangement, and/or an increase in pilot workload would be a significant change	No	No	Yes	Extensive changes to avionics and aircraft systems. Invalidates certification assumptions. Requires new AFM.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
An appreciable expansion of an aircraft's operating envelope or operating capability would normally be a significant change. e.g., an increase in maximum altitude limitation, approval for flight in known icing conditions, an increase in airspeed limitations	No	No	Yes	Invalidates certification assumptions. Requires new AFM to address performance and flight characteristics.
A major flight deck upgrade	No	No	Yes	Extensive changes to avionics and electrical systems design. Invalidates certification assumptions. Extensive reassessments of systems integration, flight crew workload, human factors evaluation are required. Requires new AFM.
Introduction of autoland	No	No	Yes	Invalidates original design assumptions

Table 1. Table of examples of changes for small aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Conventional tail to T-tail or Y-tail, or vice versa	Yes	No	Yes	Change in general configuration. Requires extensive structural, flying qualities and performance re-investigation. Requires new AFM to address performance and flight characteristics.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Addition of wingtip modifications (not winglets)	No	No	No	Although a major change to the airplane. Likely the original general configuration, principles of construction and certification assumptions remain valid.
Installation of skis or wheel skis	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
FLIR or surveillance camera installation	No	No	No	Additional flight or structural evaluation may be necessary but the change does not alter basic airplane certification
Litter, berth and cargo tie down device installation	No	No	No	Not an airplane level change.
Increased tire size, including tundra tires	No	No	No	Not an airplane level change
Replacement of one propeller type with another (irrespective of increase in number of blades)	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid

Table 1. Table of examples of changes for small aeroplanes

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Addition of a turbocharger that does not appreciably change the power envelope, operating range, or limitations (e.g., a turbo—normalised engine), (e.g., where the additional power is used to enhance high altitude or hot day performance.	No	No	No	Not an airplane level change.
Replace a petrol engine with a diesel engine or approximately the same horsepower.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
Substitution of one method of bonding for another (e.g., change in type of adhesive)	No	No	No	Not an airplane level change.
Substitution of one type of metal for another	No	No	No	Not an airplane level change.
Any change in construction or fastening not involving primary structure	No	No	No	Not an airplane level change.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
A new fabric type for fabric skinned aircraft	No	No	No	Not an airplane level change
Increase in flap speed or undercarriage limit speed	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
Structural strength increases	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid
IFR upgrades involving installation of components (where the original certification does not indicate that the aeroplane is not suitable as an IFR platform, e.g., special handling concerns).	No	No	No	Not an airplane level change.
Fuel lines, where engine horsepower is increased but fuel flow is not increased beyond the certified maximum amount	No	No	No	Not an airplane level change.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Fuel tanks, where fuel is changed from gasoline to diesel fuel and tank support loads are small enough that an extrapolation from the previous analysis would be valid. Chemical compatibility would have to be substantiated	No	No	No	Not an airplane level change.
Limited changes in a pressurisation system, e.g., number of outflow valves, type of controller, or size of pressurised compartment, but the system must be re-substantiated if the original test data is invalidated	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
Install a quieter exhaust system	No	No	No	Not an airplane level change.
Changes in engine cooling or cowling	No	No	No	Not an airplane level change.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Fuel type: AvGas to Diesel/Jet A, AvGas to Ethanol/Methanol. Changing to Multiple fuel systems containing fuel types (other than systems used for starting): such systems using as AvGas/Ethanol, or Jet A/Autogas (turbine). Unrestricted mixtures in one fuel system of different fuel types: Such as AvGas/Diesel or Jet A/Ethanol.	No	No	NO	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
Fuels of substantially the same type: Such as AvGas to AutoGas, AvGas (80/87) to AvGas (100LL), Ethanol to Isopropyl Alcohol, Jet B to Jet A (although Jet A to Jet B may be considered significant due to the fact that Jet B is considered potentially more explosive).	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Fuels that specify different levels of "conventional" fuel additives that do not change the primary fuel type. Different additive levels (controlled) of MTBE, ETBE, Ethanol, Amines, etc. in AvGas would not be considered a significant change.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
A change to the maximum take-off weight of less than 5% unless assumptions made in justification of the design are thereby invalidated	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
An additional aileron tab (e.g. on the other wing)	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Larger diameter flight control cables with no change in routing, or other system design	No	No	No	Not an airplane level change.
Autopilot installation (for IFR use, where the original certification does not indicate that the aeroplane is not suitable as an IFR platform)	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
Increased battery capacity or relocate battery	No	No	No	Not an airplane level change
Replace generator with alternator	No	No	No	Not an airplane level change.
Additional lighting (e.g., navigation lights, strobes)	No	No	No	Not an airplane level change.
Higher capacity brake assemblies	No	No	No	Not an airplane level change.
Increase in fuel tank capacity	No	No	No	Not an airplane level change.
Addition of an oxygen system	No	No	No	Not an airplane level change.
Relocation of a galley.	No	No	No	Not an airplane level change.

Table 1. Table of examples of changes for small aeroplanes

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Passenger to freight (only) conversion with no change to basic fuselage structure.	No	No	NO	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid. Requires certification substantiation applicable to freighter requirements
Installation of new seat belt or shoulder harness	No	No	No	Not an airplane level change.
A small increase in cg range.	No	No	No	At airplane level, no change in general configuration, principles of construction & certification assumptions
APU Installation that is not flight essential	No	No	No	A major change to the airplane level, likely the original general configuration, principles of construction and certification assumptions remain valid. Requires certification substantiation applicable to APU installation requirements.
An alternative autopilot	No	No	No	Not an airplane level change.
Addition of Class B Terrain Awareness and Warning Systems (TAWS)	No	No	No	Not an airplane level change

Table 2. Table of examples of changes for large aeroplanes

The following are examples of substantial changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Change in the number or location of engines, e.g., four to two wing-mounted engines or two wing mounted to two body-mounted engines.	Yes	No	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required
Change from a high wing to low wing configuration.	Yes	No	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required
Change from an all metal airplane to all composite primary structure (fuselage, wing, empennage).	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.

Table 2. Table of examples of changes for large aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Derivative model, e.g., increased passenger payload, freighter version or complete update of a certified aeroplane.	Yes	Yes	Yes	Multiple changes packaged into a new model. Increased payload new freighter would change the general configuration and assumptions. Updated aeroplane could change principles of construction.
Reduction in the number of flight crew (In conjunction with flight deck update).	Yes	No	No	Extensive changes to avionics and aircraft systems. Impact to crew workload and human factors, pilot type rating
Modify an aeroplane for flight in known icing conditions by adding systems for ice detection and elimination	Yes	No	Yes	New aircraft operating envelop. Requires major new systems installation and aircraft evaluation. Operating envelope changed
Conversion – passenger or combi to all freighter including cargo door, redesign floor structure and 9g net or rigid barrier	Yes	No	yes	Extensive airframe changes affecting load paths, aeroelastic characteristics, aircraft related systems for fire protection, etc. Design assumptions changed from passenger to freighter
Change to pressurized cabin including the introduction of a pressurization system.	No	No	yes	Essentially a recertification of airframe and systems associated with operating envelope change.

Table 2. Table of examples of changes for large aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Addition of leading edge slats	Yes	No	No	Requires extensive changes to wing structure, adds aircraft level systems, and requires a new aeroplane flight manual to address performance and flight characteristics
Fuselage length change lengthen or shorten fuselage	Yes	No	No	Requires extensive changes to fuselage structure, affects aircraft level systems, and requires a new aeroplane flight manual to address performance and flight characteristics.
Extensive structural airframe modification, such as installation of a large telescope with large opening in fuselage.	Yes	No	No	Requires extensive changes to fuselage structure, affects aircraft level systems, and requires a new aeroplane flight manual to address performance and flight characteristics.
Changing the number of axles or number of landing gear done in context with a product level change which involves changing the aeroplane gross weight.	Yes	No	No	Requires extensive changes to aircraft structure, affects aircraft l systems and requires AFM changes..

Table 2. Table of examples of changes for large aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Primary structure changes from metallic material to composite material.	No	Yes	No	Change in principles of construction and design from conventional practices.
Typically, an increase in design weight of more than 10%	No	No	Yes	When it requires extensive re-substantiation of aircraft structure, aircraft performance and flying qualities and associated systems.
Wing changes in span, sweep, and tip designs or wing chord. (Note: Potentially substantial if it is a change from a high wing to a low wing, or a new wing.)	Yes	No	yes	When it requires extensive changes to wing structure, adds aircraft level systems, and requires a new aeroplane flight manual to address performance and flight characteristics.
Change in type or number of emergency exits in conjunction with an increase in the number of passengers demonstrated.	No	No	yes	The new emergency egress requirements exceed those previously substantiated.
Comprehensive flight deck upgrade	No	No	Yes	Affects avionics and electrical systems integration and architecture concepts and philosophies. This drives a reassessment of flight crew workload and other human factors issues, and requires a re-evaluation of the original design assumptions used for the cockpit.

Table 2. Table of examples of changes for large aeroplanes

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Change in primary flight controls to fly by wire (FBW) system. (Some airplanes have some degree of FBW. Achieving full FBW may be a not significant change on some airplanes.)	Yes	No	Yes	When the degree of change is so extensive that it affects basic aircraft systems integration and architecture concepts and philosophies. This drives a complete reassessment of flight crew workload, handling qualities, and performance evaluation, which are different from the original design assumptions
Replace reciprocating with turbo-propeller engines	Yes	No	No	Requires extensive changes to airframe structure, adds aircraft level systems, and requires a new aeroplane flight manual to address performance and flight characteristics.
Typically a thrust increase of more than 10%	No	No	Yes	When it requires extensive resubstantiation of powerplant installation, and has a marked effect on aircraft performance and flying qualities.
Initial installation of an autoland system	No	No	Yes	Baseline airplane not designed for autoland operation, potential crew work load and systems compatibility issues

Table 2. Table of examples of large aircraft

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Installation of a new fuel tank, e.g., horizontal stabilizer tank or auxiliary fuel tank in the fuselage outside the wing in conjunction with increased maximum takeoff weight and takeoff thrust.	No	No	Yes	Requires changes to airframe, systems and AFM. Results in performance changes.
Main deck cargo door installation	Yes	No	No	Redistribution of internal loads, change in aeroelastic characteristics, system changes.
Conversion from a passenger floor to a cargo floor and installation of a cargo handling system.	No	No	Yes	Completely new floor loading and design. Redistribution of internal loads, change in cabin safety requirements, system changes.
Initial installation of an APU essential for aircraft flight operation.	No	No	Yes	Changes emergency electrical power requirements, change in flight manual and operating characteristics.

Table 2. Table of examples of large aircraft

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Alternate engine installation or hush kit at same position	No	No	No	Although an aeroplane level change, it is not significant so long as there is not more than a 10% increase in thrust or a change in the principles of propulsion.
Fuselage length change-lengthen or shorten fuselage	No	No	No	A small change in fuselage length due to re-fairing the aft body or radome for cruise performance reasons, where such changes do not require extensive structural, systems or AFM changes
Re-fairing of wing tip caps (e.g., for lights, fuel dump pipes) and addition of splitter plates to the trailing edge thickness of the cruise airfoil.	No	No	No	Does not require extensive structural, AFM, or systems changes.
Additional power used to enhance high altitude or hot day performance	No	No	No	Usually no change in basic operating envelope. Existing cert data can be extrapolated. Could be significant product change if the additional power is provided by installation of a rocket motor or additional, on demand engine due to changes in certification assumptions.

Table 2. Table of examples of large aircraft

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
General avionics changes.	No	No	No	These modifications are generally adaptive* in nature, and do not change the original certification assumptions, alter basic cockpit design architecture concepts and philosophies, and do not have a major impact on crew workload or man/machine. *Adaptive means the change adapts to the existing airplane buses, power, structure, …
Initial installation of an autopilot system	No	No	No	Modification is generally adaptive in nature, with no change to original certification assumptions.
Integrated modular avionics	No	No	No	The basic functionality of the systems are unchanged. No change from analogue to digital.
Installation or rearrangement of an interior in an aircraft.	No	No	No	Special conditions could be used for new and novel features
Change from assembled primary structure to monolithic or integrally machined structure	No	No	No	Method of construction is well understood.
Modification to ice protection systems	No	No	No	Re-certification required, but typecertification basis is adequate.

Table 2. Table of examples of large aircraft

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Brakes: design or material change, e.g., steel to carbon	No	No	No	Re-certification required, but typecertification basis is adequate.
Redesign floor structure	No	No	No	By itself, this is not a significant product level change. It could be a significant change if part of a cargo converted passenger airplane.
Novel or unusual method of construction of a component.	No	No	No	Special conditions could be required if there are no existing requirements that adequately address these features. The component change does not rise to the product level change
Initial installation of a non essential APU	No	No	No	A stand-alone initial APU installation on an airplane originally designed to use ground/airport supplied electricity, and air-conditioning. In this case, the APU would be an option to be independent of airport power.

Table 3. Table of examples of changes for rotorcraft

The following are examples of substantial changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Change from the number and or configuration of rotors (e.g., main & tail rotor system to two main rotors.	Yes	No	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required
Change from an all metal rotorcraft to all composite rotorcraft.	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.

Table 3. Table of examples of changes for rotorcraft

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Comprehensive Flight Deck Upgrade	Yes	No	Yes	The degree of change is so extensive that it affects basic avionics and electrical systems integration and architecture concepts and philosophies. This drives a complete reassessment of flight crew workload and other human factor issues, and requires a reevaluation of the original design assumptions used for the cockpit.
Certification for flight into known icing conditions	No	No	yes	
(Fixed) flying controls from mechanical to fly by wire	Yes	Yes	Yes	
Addition of an engine; e.g., from single to twin or reduction of the number of engines; e.g., from twin to single	Yes	No	Yes	May be Substantial - depend upon project details
A fuselage modification that changes the primary structure, aerodynamics, or operating envelope sufficiently to invalidate the certification assumptions.	Yes	No	Yes	

Table 3. Table of examples of changes for rotorcraft

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Application of an approved primary structure to a different approved model (e.g., installation on a former model of the main rotor approved on a new model that results in increase performance	No	Yes	Yes	
Extensive Primary structure changes from metallic material to composite material.	No	Yes	Yes	Change in principles of construction and assumptions used for certification for the product level change. Changes of a few individual elements from metal to composite are not typically considered a significant change .
Emergency Medical Service Configuration with primary structural changes sufficiently to invalidate the certification assumptions	Yes	No	Yes	Any EMS configuration will not be classified as significant. Modifications made for EMS is typically internal and the general external configuration is normally not affected. These changes should not automatically be classified as significant.

Table 3. Table of examples of changes for rotorcraft

The following are examples of significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Skid landing gear to wheel landing gear or wheel landing to skid	Yes	No	Yes	If the rotorcraft is such that the skid or wheel configuration is inherent in the basic certification design, the change may be not significant.
Change of the number of rotor blades	Yes	No	No	The addition/deletion of rotor blades may not be significant provided the remainder of the basic propulsion system remains essentially unchanged.
Change tail antitorque device (e.g., tail rotor, ducted fan or other technology)	Yes	Yes	No	

Table 3. Table of examples of changes for rotorcraft

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Emergency floats	No	No	No	Must Comply to the specific applicable requirements for emergency floats. This installation, in itself, does not change the rotorcraft configuration, overall performance, or operational capability. Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger carrying operations to external load operations, or flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certificated product level.
FLIR or surveillance camera installation	No	No	No	Additional flight or structural evaluation may be necessary but the change does not alter the basic rotorcraft certification
Helicopter Terrain Awareness Warning System (HTAWS) for operational credit	No	No	No	Certified per rotorcraft HTAWS AC guidance material
Health Usage Monitoring System (HUMS) for Maintenance Credit	No	No	No	Certified per rotorcraft HUMS AC guidance material

Table 3. Table of examples of changes for rotorcraft

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Expanded limitations with minimal or no design changes, following further tests/justifications or different mix of limitations (CG limits, oil temperatures, altitude, minimum/maximum weight, minimum/max external temperatures, speed, ratings structure)	No	No	No	Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger carrying operations to external load operations, or flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certificated product level.
Installation of a new engine type, equivalent to the former one; leaving a/c installation and limitations substantially unchanged	No	No	No	Refer to FAA AC 27-1 or FAA AC 29-2 for guidance
Windscreen installation	No	No	No	Does not change the rotorcraft overall product configuration

Table 3. Table of examples of changes for rotorcraft

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Snow skis, "Bear Paws"	No	No	No	Must comply with specific requirements associated with the change. Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger carrying operations to external load operations, or flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certificated product level.
External Cargo Hoist				Must Comply to the specific applicable requirements for external loads. This installation, in itself, does not change the rotorcraft configuration, overall performance, or operational capability. Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger carrying operations to external load operations, or flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certificated product level.

Table 3. Table of examples of changes for rotorcraft

The following are examples of not significant changes:

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
IFR upgrades involving installation of components (where the original certification does not indicate that the rotorcraft is not suitable as an IFR platform, e.g., special handling concerns).	No	No	No	Not a rotorcraft level change.
An upgrade to CAT A certification approval	No	No	No	Typically these are engine and drive systems rating changes appropriate for CAT A and rotorcraft performance requirements. Rotorcraft modifications, if any necessary, do not typically invalidate the certification assumptions, or change the general configuration of principles of construction.
Reducing the number of pilots for IFR from 2 to 1	No	No	No	May be significant if there are extensive equipment and design changes such that the certification assumptions are invalidated or the general configuration of the rotorcraft is changed.

Table 4. Engines and Propellers

The following are examples of significant changes:

Turbine engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Traditional turbofan to geared-fan engine	Yes	No	Yes	This change would affect the engine in terms of FOD ingestion, containment, etc… Note that this change is most likely substantial under BCAR 21.19
Low bypass ratio engine to high bypass ratio engine with an increased inlet area.	Yes	No	Yes	Change in general configuration Likely change in model designation Not interchangeable Assumptions for certification may no longer be valid in terms of ingestion, icing, etc. Note that this change is l most likely substantial under BCAR 21.19
Turbojet to Turbofan	Yes	No	Yes	Change in general configuration Likely change in model designation Not interchangeable Assumptions for certification may no longer be valid ingestion, icing, blade out criteria, etc. Note that this change is l most likely substantial under BCAR 21.19

Table 4. Engines and Propellers

The following are examples of significant changes:

Turbine engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Turbo-shaft to turbo-propeller	Yes	No	Yes	Change in configuration such as an additional gearbox Change in model designation. Change in mission profile. Assumptions for certification may no longer be valid in terms of flight envelope, ratings, etc Note that this change is l most likely substantial under BCAR 21.19
Conventional ducted fan to unducted fan	Yes	Yes	Yes	Change in configuration Change in Type. Not interchangeable Assumptions for certification may no longer be valid Note that this change is l most likely substantial under BCAR 21.19
Conventional engine for subsonic operation to afterburning engine for supersonic operation	Yes	Yes	Yes	Change in configuration Change in Type Not interchangeable Assumptions for certification may no longer be valid Change in operating envelope Note that this change is l most likely substantial under BCAR 21.19

Table 4. Engines and Propellers

The following are examples of significant changes:

Turbine engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Increase/decrease in the number of compressor/turbine stages with resultant change in approved limitations*. (* excludes life limits)	No	No	Yes	Change is associated with other changes that would affect performance envelope and may affect the dynamic behaviour in terms of backbone bending, torque spike effects on casing, surge and stall characteristics, etc.
New design fan blade and fan hub, or a bladed fan disk to a blisk or a fan diameter change that could not be retrofitted,	Yes	No	Yes	Likely change in model designation Change is associated with other changes that would affect engine thrust/power limitations and have affected the dynamic behaviour of the engine in terms of backbone bending, torque spike effects on casing, foreign object ingestion behaviour, burst model protection for the aircraft. If there is a diameter change, installation will be also affected.
Hydro-Mechanical to FADEC/EEC without hydromechanical backup	Yes	Yes	Yes	Change in engine control configuration Likely change in model designation Not interchangeable. Likely fundamental change to engine operation. Assumptions used for certification are no longer valid or were not

Table 4. Engines and Propellers

The following are examples of significant changes:

Turbine engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
A change in the containment case from hard-wall to composite or viceversa, that could not be retrofitted without additional major changes to the engine or restrictions in the initial limitations in the installation manual	No	Yes	No	Change in methods of construction that have affected inherent strength, backbone bending, blade to case clearance retention, containment wave effect on installation, effect on burst model, torque spike effects
Replacement of the gas generator (core) with a different one that is associated with changes in approved limitations* (* excludes life limits)	No	No	Yes	Change is associated with other changes that would affect performance envelope and may affect the dynamic behaviour of the engine Assumptions used for certification may no longer be valid

Table 4. Engines and Propellers

The following are examples of significant changes:

Piston engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Convert from Mechanical to Electronic Control System	Yes	Yes	No	Change in engine control configuration. : Installation interface of engine changed Changes to principles of construction: Digital controllers and sensors require new construction techniques and environmental testing.
Add Turbocharger that increases performance and changes in overall product	Yes	No	Yes	Change in general configuration: Installation interface of engine changed (exhaust system) Certification assumptions invalidated. Change in engine configuration Change in operating envelope and performance
Convert from aircooled cylinders to liquid cooled cylinders.	Yes	No	Yes	Change in general configuration: Installation interface of engine changed (cooling lines from radiator, change to cooling baffles) Certification assumptions invalidated. Change in operating envelope and engine temperature requirements.

Table 4. Engines and Propellers

The following are examples of significant changes:

Piston engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Convert from spark-ignition to compression-ignition	Yes	No	Yes	Change in general configuration: Installation interface of engine changed (no mixture lever) Certification assumptions invalidated: Change in operating envelope and performance.

Table 4. Engines and Propellers

The following are examples of significant changes:

Propellers

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Introduction of a different principle of blade retention	Yes	Yes	No	Change in propeller configuration Likely change in model designation Propeller's operating characteristics and inherent strength require re-evaluation

Table 4. Engines and Propellers

The following are examples of not significant changes:

Turbine engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Change in the material from one type of metal to another type of metal of compressor drum	No	No	No	No change in performance No likely change in model designation Assumptions are still valid
Increase/decrease in the number of compressor/turbine stages without resultant change in performance envelope	No	No	No	No change in performance Model designation may or may not change Assumptions are still valid
New components internal to the FADEC/EEC the introduction of which does not change the function of the system	No	No	No	No change in configuration Retrofitable Assumptions used for certification are still valid Possible changes in principles of construction are insignificant
Software changes	No	No	No	
Rub-strip design changes	No	No	NO	Component Level Change
A new combustor that does not change the approved limitations*, or dynamic behavior (* excludes life limits)	No	No	NO	Component Level Change
Bearing changes	No	No	No	Component Level Change

Table 4. Engines and Propellers

The following are examples of not significant changes:

Turbine engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
New blade designs with similar material that can be retrofitted	No	No	No	Component Level Change
New blade designs with similar material that can be retrofitted	No	No	No	Component Level Change
Fan blade re-design that can be retrofitted	No	No	No	Component Level Change
Oil tank re-design	No	No	No	Component Level Change
Change from one hydro-mechanical control to another hydro-mechanical control	No	No	No	Component Level Change
Change to limits on life limited components	No	No	NO	Component Level Change
Changes to limits on exhaust gas temperature	No	No	No	
Changes in certification maintenance requirements (CMR) with no configuration changes	No	No		

Table 4. Engines and Propellers

The following are examples of not significant changes:

Turbine engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Bump ratings within the product's physical capabilities that may be enhanced with gas path changes that are limited to such changes as blade re-stagger, cooling hole patterns, blade coating changes, etc.	No	No	No	
A change in principal physical properties and mechanics of load transfer of a material of primary structure or highly loaded components. For example, change from traditional metal to either an exotic alloy or a composite material on a highly loaded component	No	No	No	Component Level Change

Table 4. Engines and Propellers

The following are examples of not significant changes:

Piston engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
A change in principal physical properties and mechanics of load transfer of a material of primary structure or highly loaded components. For example, change from traditional metal to either an exotic alloy or a composite material on a highly loaded component				

Table 4. Engines and Propellers

The following are examples of not significant changes:

Piston engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
A change in principal physical properties and mechanics of load transfer of a material of primary structure or highly loaded components. For example, change from traditional metal to either an exotic alloy or a composite material on a highly loaded component	No	No	No	Component Level Change
New or redesigned cylinder head, or valves or pistons	No	No	No	Component Level Change
New or redesigned cylinder head, or valves or pistons	No	No	No	Component Level Change
Changes in crankshaft	No	No	No	Component Level Change
Changes in crankcase	No	No	No	Component Level Change
Changes in carburettor	No	No	No	Component Level Change
Changes in mechanical fuel injection system	No	No	No	No controversy-No Comments
Changes in mechanical fuel injection pump	No	No	No	Component Level Change

Table 4. Engines and Propellers

The following are examples of not significant changes:

Piston engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Engine model change to accommodate new airplane installation. No change in principles of operation of major subsystems; no significant expansion in power or operating envelopes or in limitations	No	No	No	
No change in basic principles of operation, or a simple mechanical change. For example, change from dual magneto to two single magnetos on a model	No	No	No	
Subsystem change produces no change in base input parameters, and previous analysis can be reliably extended. For example, a change in turbocharger where induction system inlet conditions remain unchanged, or if changed, the effects can be reliably extrapolated	No	No	No	

Table 4. Engines and Propellers

The following are examples of not significant changes:

Piston engines

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Change in material of secondary structure or not highly loaded component. For example, a change from metal to composite material in a non-highly loaded component, such as an oil pan that is not used as a mount pad	No	No	No	Component Level Change
Change in material that retains the physical properties and mechanics of load transfer. For example, a change in trace elements in a metal casting for ease of pouring or to update to a newer or more readily available alloy with similar mechanical properties	No	No	No	Component Level Change

Table 4. Engines and Propellers

The following are examples of not significant changes:

Propellers

Description of change	Is there a change to the general configuration? (4.1.2)	Is there a change to the principles of construction? (4.1.2)	Have the assumptions used for certification been invalidated (4.1.2)	Notes
Change in the material of a blade bearing	No	No	No	Component Level Change
Change to a component in the control system	No	No	No	Component Level Change
Change to a de-icer boot	No	No	No	Component Level Change

AMC 21.433 (a) Repair design and Record Keeping

1) Relevant substantiation data associated with a new major repair design and record keeping should include:

a) damage identification and reporting source,

b) major repair design approval sheet identifying applicable requirements and references of justifications,

c) repair drawing and/or instructions and scheme identifier,

d) correspondence with the TC, STC, design approval or ETSOA holder, if its advice on the *design* has been sought, AMC 21.433

e) structural justification (static strength, fatigue, damage tolerance, flutter etc) or references to this data,

f) effect on the aircraft, engines and/or systems, (performance, flight handling, etc as appropriate)

g) effect on maintenance programme,

h) effect on Airworthiness limitations, the Flight Manual and the Operating Manual,

i) weight and moment change,

j) special test requirements.

2) Relevant minor repair documentation includes paragraphs 1(a) and (c). Other points of paragraph 1 may be included where necessary. If the repair is outside the approved data, justification for classification is required.

3) Special consideration should be given to repairs that impose subsequent limitations on the part, product or appliance, (e.g., engine turbine segments that may only be repaired a finite number of times, number of repaired turbine blades per set, oversizing of fastener holes, etc.)
.

4) Special consideration should also be given to Life Limited parts and Critical Parts, notably with the involvement of the type-certificate or STC holder, when deemed necessary under BCAR 21.433 (b)

5) Repairs to engine critical parts would normally only be accepted with the involvement of the TC holder.

AMC 21.435(a) Classification of repairs

1) Clarification of the terms Major/Minor

a) In line with the definitions given in BCAR 21.91, a new repair is classified as 'major' if the result on the approved type design has an appreciable effect on structural performance, weight, balance, systems, operational characteristics or other characteristics affecting the airworthiness of the product, part or appliance. In particular, a repair is classified as major if it needs extensive static, fatigue and damage tolerance strength justification and/or testing in its own right, or if it needs methods, techniques or practices that are unusual (i.e., unusual material selection, heat treatment, material processes, jigging diagrams, etc.)

b) Repairs that require a re-assessment and re-evaluation of the original certification substantiation data to ensure that the aircraft still complies with all the relevant requirements are to be considered as major repairs.

c) Repairs whose effects are considered minor and require minimal or no assessment of the original certification substantiation data to ensure that the aircraft still complies with all the relevant requirements, are to be considered “minor”

d) It is understood that not all the certification substantiation data will be available to those persons/organizations classifying repairs. A qualitative judgment of the effects of the repair will therefore be acceptable for the initial classification. The subsequent review of the design of the repair may lead to it being re-classified, owing to early judgments being no longer valid.

2) Airworthiness concerns for Major/Minor classification

a) The following should be considered for the significance of their effect when classifying repairs. Should the effect be considered to be significant then the repair should be classified 'Major'. The repair may be classified as 'Minor' where the effect is known to be without appreciable consequence.

i) Structural performance:
Structural performance of the product includes static strength, fatigue, damage tolerance, flutter and stiffness characteristics. Repairs to any element of the structure should be assessed for their effect upon the structural performance.

ii) Weight and balance:
The weight of the repair may have a greater effect upon smaller aircraft as opposed to larger aircraft. The effects to be considered are related to overall aircraft centre of gravity and aircraft load distribution. Control surfaces are particularly sensitive to the

changes due to the effect upon the stiffness, mass distribution and surface profile which may have an affect upon flutter characteristics and controllability.

iii) Systems:
Repairs to any elements of a system should be assessed for the effect intended on the operation of the complete system and for the effect on system redundancy. The consequence of a structural repair on an adjacent or remote system should also be considered as above, (for example: airframe repair in area of a static port).

iv) Operational characteristics
Changes may include:

- stall characteristics
- handling
- performance and drag
- vibration

v) Other characteristics

- changes to load path and load sharing
- change to noise and emissions
- fire protection / resistance

Note: Considerations for classifying repairs 'Major/Minor' should not be limited to those listed above.

3) Examples of 'Major' repairs

i) A repair that requires a permanent additional inspection to the approved maintenance programme, necessary to ensure the continued airworthiness of the product. Temporary repairs for which specific inspections are required prior to installation of a permanent repair do not necessarily need to be classified as 'Major'. Also, inspections and changes to inspection frequencies not required as part of the approval to ensure continued airworthiness do not cause classification as 'Major' of the associated repair.

ii) A repair to life limited or critical parts.

iii) A repair that introduces a change to the Aircraft Flight Manual.

AMC 21.437 Issue of repair design approval

1) Approval by DOA holder

Approval of repairs through the use of procedures agreed with the Agency, means an approval issued by the DOA holder without requiring Agency involvement. The Agency will monitor application of this procedure within the surveillance plan for the relevant organisation. When the organisation exercises this privilege, the repair release documentation should clearly show that the approval is under their DOA privilege.

2) Previously approved data for other application

When it is intended to use previously approved data for other applications, it is expected that applicability and effectiveness would be checked with an appropriately approved design organisation. After damage identification, if a repair solution exists in the available approved data, and if the application of this solution to the identified damage remains justified by the previous approved repair design, (structural justifications still valid, possible airworthiness limitations unchanged), the solution can be considered approved and can be used again.

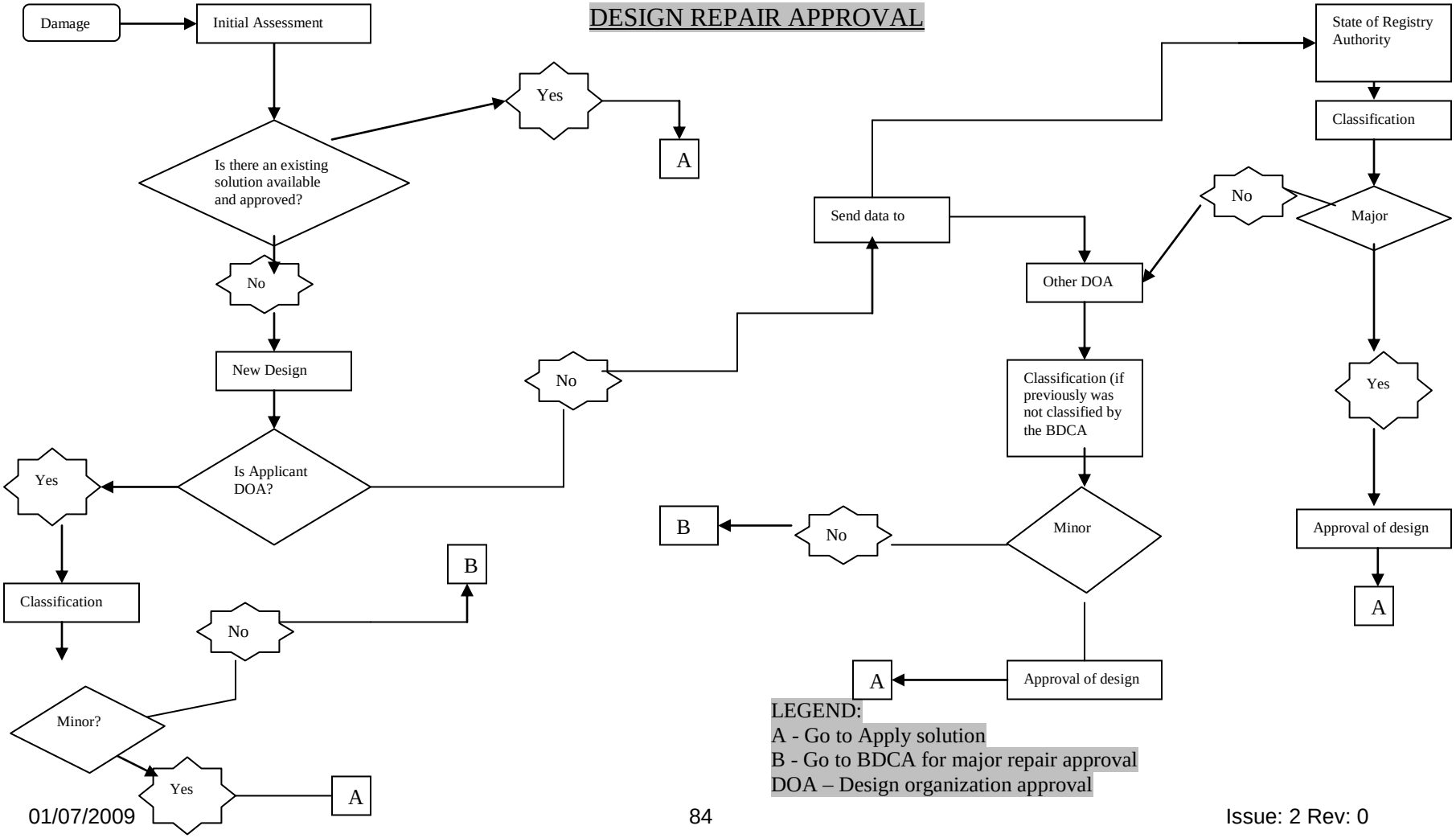
3) Temporary repairs.

These are repairs that are life limited, to be removed and replaced by a permanent repair after a limited service period. These repairs should be classified under 21A.435 and the service period defined at the approval of the repair.

4) Fatigue and damage tolerance.

When the repaired product is released into service before the fatigue and damage tolerance evaluation has been completed, the release should be for a limited service period, defined at the issue of the repair.

DESIGN REPAIR APPROVAL



LEGEND:
A - Go to Apply solution
B - Go to BDCA for major repair approval
DOA – Design organization approval