For Training Purpose Only

Bachelor of Aviation Maintenance Engineering Technology

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Aviation Legislation

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CAR 21 Aircraft Certification General (a)

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CAR-21 Certification of Aircraft and Related Products, Parts and Appliances, and of Design and Production Organizations

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REGULATIONS

REQUIREMENTS FOR APPLICANTS AND ACQUIRED RIGHTS AND OBLIGATIONS

SUBPART A - GENERAL PROVISIONS

CAR 21.1 Scope

This Regulation establishes general provisions governing the rights and obligations of the applicant for, and holder of, any certificate issued or to be issued in accordance with this Regulation.

CAR 21.2 Undertaking by another person than the applicant for, or holder of, a certificate

The actions and obligations required to be undertaken by the holder of, or applicant for, a certificate for a product, part or appliance under this Regulation may be undertaken on his behalf by any other natural or legal person, provided the holder of, or applicant for, that certificate can show that it has made an agreement with the other person such as to ensure that the holder's obligations are and will be properly discharged.

CAR 21.3A Failures, malfunctions and defects

(a) System for Collection, Investigation and Analysis of Data.

The holder of a type-certificate, restricted type-certificate, supplemental type-certificate, UAE Technical Standard Order (UAE TSO) authorization, major repair design approval or any other relevant approval deemed to have been issued under this Regulation shall have a system for collecting, investigating and analyzing reports of and information related to failures, malfunctions, defects or other occurrences which cause or might cause adverse effects on the continuing airworthiness of the product, part or appliance covered by the type-certificate, restricted type-certificate, supplemental type-certificate, UAE TSO authorization, major repair design approval or any other relevant approval deemed to have been issued under this Regulation. Information about this system shall be made available to all known operators of the product, part or appliance and, on request, to any person authorized under other associated Regulations.

(b) Reporting to the Authority.

1. The holder of a type-certificate, restricted type-certificate, supplemental type-certificate, UAE TSO authorization, major repair design approval or any other relevant approval deemed to have been issued under this Regulation shall report to the Authority any failure, malfunction, defect or other occurrence of which it is aware related to a product, part, or appliance covered by the type-certificate, restricted type-certificate, supplemental type-certificate, UAE TSO authorization, major repair design

approval or any other relevant approval deemed to have been issued under this Regulation, and which has resulted in or may result in an unsafe condition.

2. These reports shall be made in a form and manner established by the Authority, as soon as practicable and in any case dispatched not later than 72 hours after the identification of the possible unsafe condition, unless exceptional circumstances prevent this.

(c) Investigation of Reported Occurrences.

1. When an occurrence reported under paragraph (b), or under points CAR 21.129(f)(2) or CAR 21.165(f)(2) results from a deficiency in the design, or a manufacturing deficiency, the holder of the type-certificate, restricted type-certificate, supplemental type-certificate, major repair design approval, UAE TSO authorization, or any other relevant approval deemed to have been issued under this Regulation, or the manufacturer as appropriate, shall investigate the reason for the deficiency and report to the Authority the results of its investigation and any action it is taking or proposes to take to correct that deficiency.

2. If the Authority finds that an action is required to correct the deficiency, the holder of the type-certificate, restricted type-certificate, supplemental type-certificate, major repair design approval, UAE TSO authorization, or any other relevant approval deemed to have been issued under this Regulation, or the manufacturer as appropriate, shall submit the relevant data to the Authority.

CAR 21.3B Airworthiness directives

(a) An airworthiness directive means a document issued or adopted by the Authority which mandates actions to be performed on an aircraft to restore an acceptable level of safety, when evidence shows that the safety level of this aircraft may otherwise be compromised.

(b) The Authority shall issue airworthiness directive when:

1. an unsafe condition has been determined by the Authority to exist in an aircraft, as a result of a deficiency in the aircraft, or an engine, propeller, part or appliance installed on this aircraft; and

2. that condition is likely to exist or develop in other aircraft.

(c) When an airworthiness directive has to be issued by the Authority to correct the unsafe condition referred to in paragraph (b), or to require the performance of an inspection, the holder of the type-certificate, restricted type-certificate, supplemental type-certificate,

major repair design approval, UAE TSO authorization or any other relevant approval deemed to have been issued under this Regulation, shall:

1. Propose the appropriate corrective action or required inspections, or both, and submit details of these proposals to the Authority for approval.

2. Following the approval by the Authority of the proposals referred to under point (1), make available to all known operators or owners of the product, part or appliance and, on request, to any person required to comply with the airworthiness directive, appropriate descriptive data and accomplishment instructions.

(d) An airworthiness directive shall contain at least the following information:

1. An identification of the unsafe condition;

2. An identification of the affected aircraft;

3. The action(s) required;

4. The compliance time for the required action(s);

5. The date of entry into force.

CAR 21.4 Coordination between design and production

Each holder of a type-certificate, restricted type-certificate, supplemental type-certificate, UAE TSO authorization, approval of a change to type-certificate or approval of a repair design, shall collaborate with the production organization as necessary to ensure:

(a) The satisfactory coordination of design and production required by CAR 21.122, CAR 21.130(b)(3) and (4), CAR 21.133 and CAR 21.165(c)(2) and (3) as appropriate, and

(b) The proper support of the continued airworthiness of the product, part or appliance.

CAR 21.5 Safety Management System

As of November 14th 2013, a UAE based CAR 21 Design and Production organizations involved in design and production of a complete aircraft shall establish and implement safety management system as specified in CAR Part X.

SUBPART B - TYPE-CERTIFICATES AND RESTRICTED TYPE-CERTIFICATES

CAR 21.11 Scope

This Subpart establishes the procedural requirements for issuing type-certificates for products and restricted type-certificates for aircraft, and establishes the rights and obligations of the applicants for, and holders of, those certificates

CAR 21.13 Eligibility

Any natural or legal person that has demonstrated, or is in the process of demonstrating, his capability in accordance with CAR 21.14 shall be eligible as an applicant for a type-certificate or a restricted type-certificate under the conditions laid down in this Subpart.

CAR 21.14 Demonstration of capability

(a) Any organization applying for a type-certificate or restricted type-certificate shall demonstrate its capability by holding a design organization approval, issued by the Authority in accordance with Subpart J.

CAR 21.16A Certification Specifications (CS)

(a) The Authority shall accept certification specifications, including certification specifications for operational suitability data, issued by EASA as standard means todemonstrate compliance of products, parts and appliances with the essential requirements. Such specifications shall be sufficiently detailed and specific to indicate to applicants the conditions under which certificates will be issued.

(b) The Authority may accept a set of certification specifications that conform with ICAO Annex 8 and provide equivalent level of safety to certification specifications issued by EASA.

The applicable certification specifications (CS) and airworthiness codes are:

- CS-APU - Auxiliary Power Units
- CS-AWO - All Weather Operations
- CS-E - Engines
- CS-ETSO - European Technical Standard Orders
- CS-P - Propellers
- CS-VLA - Very Light Aeroplanes
- CS-VLR - Very Light Rotorcraft
- CS-22 - Sailplanes and Powered Sailplanes
- CS-23 - Normal, Utility, Aerobatic and Commuter Category Aeroplanes
- CS-25 - Large Aeroplanes
- CS-27 - Small Rotorcraft
- CS-29 - Large Rotorcraft
- CS-30 - Certification Specifications for Airships
- CS-31HB - Certification Specifications for Hot Air Balloons
- CS-34 - Aircraft Engine Emissions and Fuel Venting
- CS-36 - Aircraft Noise

Figure 5.2: Aircraft are designed, manufactured and certified to the CertificationSpecification "Airworthiness Codes"

Certification of Parts

Some parts are made for fitment to various aircraft and equipments; for example a hydraulic non-return valve could have many applications, but only has to be certified once. These parts may be certified in one of three ways:

- European Technical Standard Order authorization (ETSO)
- Specifications written in the aircraft certification process.
- Standard parts in accordance with officially recognized standards.

Structure of Aircraft Certification Specifications

If you look at the airworthiness standards for aircraft certification (CS 23, 25, 27 or 29 for example) you will find a common structure. The Structure is as follows:

- **Subpart A:** General. This Subpart provides information about the types and categoriesof aircraft to which the standard is applicable.
- **Subpart B**: Flight. This Subpart deals with the flight tests to be carried out to show compliance with the requirements for performance, controllability and manoeuvrability, stability, etc.

This Subpart does not exclusively cover certification flight tests; other Subparts contain some requirements that must be complied with through flight tests.

- **Subpart C:** Structure. This Subpart contains the requirements for flight and ground load assessment, and for structural design of airframes, gears, and other components. Crashworthiness and fatigue requirement are also provided.

- **Subpart D:** Design and Construction. This Subpart deals with the design technique, materials, safety factors, control system and landing gear design, structural tests to be carried out, cockpit and passenger cabin design, fire protection and flutter requirements, etc.

- **Subpart E:** Power Plant. This Subpart contains the requirements for power plant installations and related systems (like fuel, oil, exhaust systems, etc.). Power plant controls, accessories, and fire protection are also considered.

- **Subpart G:** Operating Limitations and Information. This Subpart provides requirements for all the information that must be available to the pilot and other personnel for correct aircraft operations: from marking and placards, to the flight manual content.

- **Appendices:** These documents are of various natures; they can provide simplified design load criteria, test procedures for assessment of material flammability, instructions for continued airworthiness, and other information.

CAR 21.20 Compliance with the type-certification basis, operational suitability data certification basis and environmental protection requirements

(a) The applicant for a type-certificate or a restricted type-certificate shall demonstrate compliance with the applicable type-certification basis, the applicable operational suitability data certification basis and environmental protection requirements and shall provide to the Authority the means by which such compliance has been demonstrated.

(b) The applicant shall provide the Authority with a certification programme detailing the means for compliance demonstration. This document shall be updated as necessary during the certification process.

(c) The applicant shall record justification of compliance within compliance documents according to the certification programme established under point (b).

(d) The applicant shall declare that it has demonstrated compliance with all applicable type certification basis and environmental protection requirements according to the certification programme established under point (b).

(e) Where the applicant holds an appropriate design organization approval, the declaration of point (b) shall be made according to the provisions of Subpart J.

CAR 21.21 Issue of a type-certificate

The applicant shall be entitled to have a product type-certificate issued by the Authority after:

(a) Demonstrating his capability in accordance with point CAR 21.14;

(b) Submitting the declaration referred to in point CAR 21.20(b); and

(c) It is shown that:

1. The product to be certificated meets the applicable type-certification basis and environmental protection requirements designated in accordance with point CAR 21.17A and CAR 21.18.

2. Any airworthiness provision not complied with are compensated for by factors that provide an equivalent level of safety;

3. No feature or characteristiccertification is requested; and makes it unsafe for the uses for which certification is requested; and

4. The type-certificate applicant has expressly stated that it is prepared to comply with point CAR 21.44

(d) In the case of an aircraft type-certificate, the engine or propeller, or both, if installed in the aircraft, have a type-certificate issued or determined in accordance with this regulation.

(e) In the case of an aircraft type-certificate, it is demonstrated that the operational suitability data meets the applicable operational suitability data certification basis in accordance with point CAR 21.17B

CAR 21.23 Issue of a Restricted Type Certificate

(a) For an aircraft that does not meet the provisions of point CAR 21.21(c), the applicant shall be entitled to have a restricted type-certificate after:

1. Complying with the appropriate type certification basis established by the Authority ensuring adequate safety with regard to the intended use of the aircraft, and with the applicable environmental protection requirements;
2. Expressly stating that it is prepared to comply with point CAR 21.44.
3. In the case of an aircraft restricted type-certificate, it is demonstrated that the operational suitability data meets the applicable operational suitability data certification basis designated in accordance with point CAR 21.17B.

(b) By derogation from point 3 of point (a), and at the request of the applicant included in thedeclaration referred to in point CAR 21.20(d), a restricted type-certificate may be issuedbefore compliance with the applicable operational suitability data certification basis has been demonstrated, subject to the applicant demonstrating compliance with the operational suitability data certification basis before the operational suitability data mustactually be used.

(c) The engine or propeller installed in the aircraft , or both shall:

- Have a type certificate issued or determined in accordance with this Regulation; or
- Have been shown to be in compliance with the certification specifications necessary to ensure safe flight of the aircraft.

CAR 21.31 Type design

(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 the applicable type-certification basis and environmental protection requirements;
2. Information on materials and processes and on methods of manufacture and assembly of the product necessary to ensure the conformity of the product;
3. An approved airworthiness limitations section of the instructions for continued airworthiness as defined by the applicable certification specifications; and
4. Any other data necessary to allow by comparison, the determination of the airworthiness, the characteristics of noise, fuel venting, and exhaust emissions(where applicable) of later products of the same type.

(b) Each type design shall be adequately identified.

CAR 21.41 Type-certificate

The type-certificate and restricted type-certificate shall include the type design, the operating limitations, the type-certificate data sheet for airworthiness and emissions, the applicable type-certification basis and environmental protection requirements with which the Authority records compliance, and any other conditions or limitations prescribed for the product in the applicable certification specifications and environmental protection requirements. The aircraft type-certificate and restricted type-certificate, in addition, shall both include the applicable operational suitability data certification basis, the operational suitability data and type-certificate data sheet for noise. The engine type-certificate data sheet shall include the record of emission compliance.

CAR 21.57 Manuals

The holder of a type-certificate or restricted type-certificate shall produce, maintain and update master copies of all manuals required by the applicable type-certificationbasis, the applicable operational suitability data and environmental protection requirements for the product, and provide copies, on request, to the Authority.

CAR 21.61 Instructions for continued airworthiness

When an aircraft, engine, or propeller is sold or gets its first certificate:

- The **manufacturer (type certificate holder)** must give the **owner** a full set of instructions for how to keep it airworthy (safe to fly).
- These instructions must include descriptions and steps for maintenance, based on the rules used to certify the aircraft.

After that:

- The manufacturer must also provide these instructions to **anyone else who needs them** (like mechanics or other owners), if they ask.
- Some parts of the manual, like heavy maintenance or overhaul instructions, can be shared **later**, but **before the aircraft or part gets too old or has flown too many hours**.

(a) 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 distributedshall be submitted to the Authority.

SUBPART D - CHANGES TO TYPE-CERTIFICATES AND RESTRICTED TYPE-CERTIFICATES

CAR 21.90A Scope

This Subpart establishes the procedure for the approval of changes to type-certificates and establishes the rights and obligations of the applicants for, and holders of, those approvals. This Subpart also defines standard changes that are not subject to an approval process under this Subpart. In this Subpart, references to type-certificates include type-certificate and restricted type-certificate.

CAR 21.91 Classification of changes to a type-certificate

Changes to a type-certificate 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, noise, fuel venting, exhaust emission, operational suitability data or other characteristics affecting the airworthiness of the product. Without prejudice to point CAR 21.19,

"Major changes " are all other changes under this Subpart.

Major and minor changes shall be approved in accordance with points CAR 21.95 or CAR 21.97 as appropriate, and shall be adequately identified**.**

- For aircraft, an application for a new TC is required if the proposed change is:
    - In the number of engines or rotors.
    - To engines or rotors using different principles of operation.

- For an engine, an application for a new TC is required if the proposed change is in the principle of operation.
- For a propeller an application for a new TC is required if the proposed change is in the number of blades or principle of pitch change operation.

SUB PART E – SUPPLEMENTAL TYPE CERTIFICATION

What is a Supplemental Type Certificate (STC)? – Easy Explanation

Usually, design changes to an aircraft are made by the **Type Certificate Holder (TCH)** – the original manufacturer.

But there's another way:

- If **someone else** wants to make a **major change** to an aircraft (or its engine, propeller, etc.), and the change **doesn't need a brand-new type certificate,** they must apply for a **Supplemental Type Certificate (STC)** from the **GCAA**.
- To apply for an STC, the person or company must:
    - Have **Design Organization Approval (DOA)**, **or**
    - Follow approved procedures that show they have the right skills, tools, and steps to meet safety rules.
- The **STC approval process** is similar to how new aircraft or engines are certified.
- Once an STC is approved:
    - Only the **STC holder** or **someone with their permission** can make the change to the aircraft or part.

SUBPART F - PRODUCTION WITHOUT PRODUCTION ORGANISATION APPROVAL

CAR 21.121 Scope

(a) This Subpart establishes the procedural requirements for demonstrating the conformity with the applicable design data of a product, part and appliance that is intended to be manufactured without a production organization approval under Subpart G.

(b) This Subpart establishes the rules governing the obligations of the manufacturer of a product, part, or appliance being manufactured under this Subpart.

CAR 21.125A Issue of a letter of agreement

The applicant shall be entitled to have a letter of agreement issued by the Authority agreeing to the showing of conformity of individual products, parts and appliances under this Subpart, after:

(a) having established a production inspection system that ensures that each product, part or appliance conforms to the applicable design data and is in condition for safe operation;

(b) having provided a manual that contains: CAR 21

1. a description of the production inspection system required under (a);
2. a description of the means for making the determination of the production inspection system;
3. a description of the tests required in CAR 21.127 and CAR 21.128, and the names of persons authorized for the purpose of CAR 21.130(a);

SUBPART G - PRODUCTION ORGANISATION APPROVAL

CAR 21.131 Scope

This Subpart establishes:

(a) The procedural requirements for the issuance of a production organization approval for a production organization showing conformity of products, parts and appliances with the applicable design data.

(b) The rules governing the rights and obligations of the applicant for, and holders of, such approvals.

CAR 21.133 Eligibility

Any natural or legal person („organization") shall be eligible as an applicant for an approval under this Subpart.

CAR 21.135 Issue of production organization approval

An organization shall be entitled to have a production organization approval issued by the Authority when it has demonstrated compliance with the applicable requirements under this Subpart.

CAR 21.139 Quality system

(a) The production organization shall demonstrate that it has established and is able to maintain a quality system. The quality system shall be documented. This quality system shall be such as to enable the organization to ensure that each product, part or appliance produced by the organization or by its partners, or supplied from or subcontracted to outside parties, conforms to the applicable design data and is in condition for safe operation.

(b) The quality system shall contain control procedures as applicable within the scope of approval

(c) An independent quality assurance function to monitor compliance with, and adequacy of, the documented procedures of the quality system.

CAR 21.145 Approval requirements

The production organization shall demonstrate, on the basis of the information submitted in accordance with CAR 21.143 that:

(a) To get general approval, the company must have suitable facilities, good working conditions, the right equipment and tools, proper processes and materials, enough qualified staff, and a well-organized system to meet the rules of CAR 21.165..

(b) With regard to all necessary airworthiness, noise, fuel venting and exhaust emissions data:

1. The production organization receives this important data from the aviation authority and from the certificate or design approval holder. This helps make sure everything matches the approved design.
2. The production organization has established a procedure to ensure that airworthiness, noise, fuel venting and exhaust emissions data are correctly incorporated in its production data.
3. Such data are kept up to date and made available to all personnel who need access to such data to perform their duties.

(c) With regard to management and staff:

1. A manager has been nominated by the production organization, and is accountable to the Authority.
2. A person or group of persons have been nominated by the production organization to ensure that the organization is in compliance with the requirements of this Part, and are identified, together with the extent of their Authority.
3. Staff at all levels have been given appropriate Authority to be able to discharge their allocated responsibilities.

(d) With regard to certifying staff, authorized by the production organization to sign the documents issued under CAR 21.163 under the scope or terms of approval.

1. The knowledge, background (including other functions in the organization), and experience of the certifying staff are appropriate to discharge their allocated responsibilities.
2. The production organization maintains a record of all certifying staff which shall include details of the scope of their authorization.
3. Certifying staff are provided with evidence of the scope of their authorization.

SUBPART J - DESIGN ORGANISATION APPROVAL

CAR 21.231 Scope

This Subpart establishes the procedural requirements for the approval of design organizations and rules governing the rights and obligations of applicants for, andholders of, such approvals.

The main duties and responsibilities of a design organization are:

- To design.
- To demonstrate compliance with the applicable requirements.
- To independently check the statements of compliance.
- To provide items for continued airworthiness.
- To check the job performed by partners/subcontractors:
- To independently monitor the above functions.
- To provide the authority with the compliance documentation.
- To allow the authority to make any inspection and any flight and ground tests necessary to check the validity of the statements of compliance.

CAR 21.239 Design Assurance System

A key requirement—apart from having a normal design team—is setting up a **Design Assurance System (DAS)**. This system helps manage and oversee the design process and any changes made to the product. It covers everything needed to:

- Get the type certificate,
- Approve any design changes, and
- Make sure the product stays airworthy over time.

In particular, the **DAS** should include an organizational structure to:

- Control the design.
- Show compliance with the applicable certification standard and environmental requirements.
- Show compliance with protection requirements.
- Independently check this compliance.
- Liaise with the Agency.
- Continuously evaluate the design organization.
- Control subcontractors.

A DOA is for a particular part or product. It should be noted that an aircraft or engine manufacturer will normally have both DOA and POA approvals.