



Standard Practice for Application of Federal Aviation Administration (FAA) Federal Aviation Regulations Part 21 Requirements to Unmanned Aircraft Systems (UAS)¹

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INTRODUCTION

STRUCTURE AND ASSUMPTIONS

Introduction—This standard practice (SP) document uses 14 CFR Part 21 as a template, retaining all sections of Part 21, many of which will not be altered by the incorporation of certification procedures for Unmanned Aircraft Systems (UAS). The UAS certification procedures that have been inserted into the Part 21 template may, therefore, be seen in the context of procedures prescribed for other civil air vehicles that undergo airworthiness certification. The resulting document is perhaps misnamed as a “standard practice” since it is, in fact, a prototype for a future version of Part 21 that will accommodate UAS airworthiness certification. Anticipating this future version of Part 21, the SP provides a framework for other ASTM standards development and standard-practice initiatives related to UAS certification.

Scope of Changes to Part 21 Text—This version of the SP provides certification procedures for unmanned aircraft systems in the light UAS class and in the Remotely Operated Aircraft (ROA/UAS) Class. Unmanned aircraft systems in the mini UAS and micro UAS Classes are not considered in this SP.

Certification Pathways—The SP anticipates that light UAS and the larger ROA/UAS will follow distinctly different certification procedural pathways:

- Light UAS will be certified to consensus standards, in a process similar to that established for light sport aircraft in the current Part 21 (section 21.190). This process will lead to issue of a special certificate of airworthiness for the light UAS; and
- ROA/UAS will follow a conventional certification pathway described in Part 21, section 21.17(a), leading to issue of a type certificate as described in Part 21, section 21.21, and issue of a standard certificate of airworthiness under Part 21, section 21.183.

Applicable Requirements—The SP anticipates that the core requirements for the basis of certification for the light UAS and ROA/UAS classes will be based on published design/airworthiness standards that do not yet exist, specifically:

- Industry consensus standards for light UAS, prescribing airworthiness requirements for the issue of a Special Certificate of Airworthiness for the smaller UAS; and
- Regulator-approved Airworthiness Standards prescribing airworthiness requirements for the issue of type certificates and changes to type certificates for ROA/UAS UAS.

Special-Classes Certification Pathway—The SP retains the Part 21 concept of special classes aircraft, that is, “non-conventional aircraft for which airworthiness standards have not been issued under this Subchapter (14 CFR Subchapter C).” UAS fit well within this definition of the special classes, quoted here from Part 21, section 21.17(b); furthermore, the means for defining the “applicable requirements” for a UAS basis of certification are clearly stated in section 21.17(b). Use of this pathway for the early UAS certification candidates should be considered.

1. Scope

1.1 In this practice, certification procedures are provided for Unmanned Aircraft Systems (UAS) in the Light UAS Class and in the Remotely Operated Aircraft (ROA) UAS Classes. Unmanned Aircraft Systems in the Mini UAS and Micro UAS Classes are not considered in this practice, since they do not undergo airworthiness certification.

1.2 *Citations of Federal Aviation Regulations*—When citing U.S. Federal Aviation Regulations in this practice, the citation references are based on the following Federal Aviation Regulation structure:

1.2.1 The Code of Federal Regulations, Title 14 (14 CFR) comprises Aeronautics and Space Regulations. Chapter 1 of 14 CFR contains the regulations of the Federal Aviation Administration and is subdivided into subchapters and parts:

Subchapter A: Definitions	Part 1
Subchapter B: Procedural Rules	Parts 11–17
Subchapter C: Aircraft	Parts 21–49
Subchapter D: Airmen	Parts 60–67
Subchapter E: Airspace	Parts 71–77
Subchapter F: Air Traffic and General Operating Rules	Parts 91–105
Subchapter G: Air Carriers and Operators	Parts 119–139

1.2.1.1 The Parts are further subdivided into Subparts and sections.

1.2.2 This practice uses Part 21 as a template. Within the text of the practice:

1.2.2.1 14 CFR Chapter 1 means the whole of Chapter 1 of 14 CFR; and

1.2.2.2 Subchapter C means all of the Parts of Subchapter C of 14 CFR.

1.2.3 In compact notation, citation of section 1309 of Part 23, for example, may be designated as “section 23.1309.”

1.3 *Unmanned Aircraft Systems*—An Unmanned Aircraft System (UAS) comprises an unmanned air vehicle, the remote control ground station that provides for the mission management and piloting of the air vehicle, data-links for the exchange of control and sensor payload data and all related interfaces. Any part of the overall system that could affect the airworthiness and safety of the aircraft is subject to the requirements of Part 21.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Significance and Use

2.1 This practice is intended for guidance and instruction of the aircraft and unmanned aircraft systems industries when addressing the requirements of Part 21.

¹ This practice is under the jurisdiction of ASTM Committee F38 on Unmanned Aircraft Systems and is the direct responsibility of Subcommittee F38.01 on Airworthiness.

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3. Subpart A—General

3.1 *Scope*—This practice prescribes (21.1(a))²:

3.1.1 Procedural requirements for the issue of type certificates and changes to those certificates, the issue of production certificates, the issue of airworthiness certificates, and the issue of export airworthiness approvals (21.1(a)(1));

3.1.2 Rules governing the holders of any certificate specified in 3.1.1 (21.1(a)(2)); and

3.1.3 Procedural requirements for the approval of certain materials, parts, processes, and appliances (21.1(a)(3)).

3.2 *Products*—For the purposes of this practice, the word “product” means an aircraft, an unmanned aircraft system, an aircraft engine, or propeller. In addition, for the purposes of Subpart L only, it includes components and parts of aircraft, of unmanned aircraft systems, of aircraft engines, and of propellers and also parts, materials, and appliances approved under the Technical Standard Order system (21.1(b)).

3.3 *Airplanes or Rotorcraft Flight Manual*—With each airplane or rotorcraft that was not type certificated with an airplane or rotorcraft flight manual and that has had no flight time before March 1, 1979, the holder of a type certificate (including a supplemental type certificate) or the licensee of a type certificate shall make available to the owner at the time of delivery of the aircraft a current approved airplane or rotorcraft flight manual (21.5(a)).

3.4 The airplane or rotorcraft flight manual required by 3.3 must contain the following information (21.5(b)):

3.4.1 The operating limitations and information required to be furnished in an airplane or rotorcraft flight manual or in manual material, markings, and placards, by the applicable regulations under which the airplane or rotorcraft was type certificated (21.5(b)(1)).

3.4.2 The maximum ambient atmospheric temperature for which engine cooling was demonstrated must be stated in the performance information section of the flight manual if the applicable regulations under which the aircraft was type certificated do not require ambient temperature on engine cooling operating limitations in the flight manual (21.5(b)(2)).

4. Subpart B—Type Certificates

4.1 *Applicability*—This Subpart prescribes (21.11):

4.1.1 Procedural requirements for the issue of type certificates for aircraft, unmanned aircraft systems, aircraft engines, and propellers (21.11(a)), and

4.1.2 Rules governing the holders of those certificates (21.11(b)).

4.2 *Eligibility*—Any interested person may apply for a type certificate (21.13).

4.3 *Application for Type Certificate* (21.15):

4.3.1 An application for a type certificate is made on a form and in a manner prescribed by the FAA Administrator and is submitted to the appropriate Aircraft Certification Office (21.15(a)).

4.3.2 An application for an aircraft or an unmanned aircraft system type certificate must be accompanied by a three-view

² Items at the end of each section enclosed in parentheses identify the applicable FAR Part 21 paragraph.

drawing of that aircraft or unmanned aircraft system and available preliminary basic data (21.15(b)).

4.3.3 An application for an aircraft engine type certificate must be accompanied by a description of the engine design features, the engine operating characteristics, and the proposed engine operating limitations (21.15(c)).

4.4 *Special Conditions*—If the Administrator finds that the airworthiness regulations of Subchapter C do not contain adequate or appropriate safety standards for an aircraft, unmanned aircraft system, aircraft engine, or propeller because of a novel or unusual design feature of the aircraft, unmanned aircraft system, aircraft engine, or propeller, he/she prescribes special conditions and amendments for the product. The special conditions are issued in accordance with Part 11 and contain such safety standards for the aircraft, unmanned aircraft system, aircraft engine, or propeller as the Administrator finds necessary to establish a level of safety equivalent to that established in the regulations (21.16).

4.5 *Designation of Applicable Regulations* (21.17):

4.5.1 Except as provided in Sections 23.2, 25.2, 27.2, 29.2 and in Parts 34 and 36, an applicant for a type certificate must show that the aircraft, unmanned aircraft system, aircraft engine, or propeller concerned meets (21.17(a)):

4.5.1.1 The applicable requirements of Subchapter C that are effective on the date of application for that certificate unless (21.17(a)(1)):

(1) Otherwise specified by the FAA Administrator (21.17(a)(1)(i)), or

(2) Compliance with later effective amendments is elected or required under 4.5 (21.17(a)(1)(ii)), and

(3) Any special conditions prescribed by the FAA Administrator (21.17(a)(2)).

4.5.2 For special classes of aircraft, including the engines and propellers installed (for example, gliders, airships, and other no conventional aircraft) for which airworthiness standards have not been issued under Subchapter C, the applicable requirements will be the portions of those other airworthiness requirements contained in Parts 23, 25, 27, 29, 31, 33, and 35 found by the FAA Administrator to be appropriate for the aircraft and applicable to a specific type design or such airworthiness criteria as the Administrator may find provides an equivalent level of safety to those parts (21.17(b)).

4.5.3 An application for type certification of a transport category aircraft is effective for five years and an application for any other type certificate is effective for 3 years unless an applicant shows at the time of application that his product requires a longer period of time for design, development, and testing and the FAA Administrator approves a longer period (21.17(c)).

4.5.4 In a case in which a type certificate has not been issued, or it is clear that a type certificate will not be issued within the time limit established under 4.5.3, the applicant may (21.17(d)):

4.5.4.1 File a new application for a type certificate and comply with all the provisions of 4.5.1 applicable to an original application (21.17(d)(1)), or

4.5.4.2 File for an extension of the original application and comply with the applicable airworthiness requirements of

Subchapter C that were effective on a date to be selected by the applicant not earlier than the date that precedes the date of issue of the type certificate by the time limit established under 4.5.3 for the original application (21.17(d)(2)).

4.5.5 If an applicant elects to comply with an amendment to Subchapter C that is effective after the filing of the application for a type certificate, he must also comply with any other amendment that the Administrator finds is directly related (21.17(e)).

4.5.6 For primary category aircraft, the requirements are (21.17(f)):

4.5.6.1 The applicable airworthiness requirements contained in Parts 23, 27, 31, 33 and 35, or such other airworthiness criteria as the FAA Administrator may find appropriate and applicable to the specific design and intended use and provide a level of safety acceptable to the Administrator (21.17(f)(1)).

4.5.6.2 The noise standards of Part 36 applicable to primary category aircraft (21.17(f)(2)).

4.6 *Changes Requiring a New Type Certificate*—Each person who proposes to change a product must apply for a new type certificate if the Administrator finds that the proposed change in design, power, thrust, or weight is so extensive that a substantially complete investigation of compliance with the applicable regulations is required (21.19).

4.7 *Issue of Type Certificate: Normal, Utility, Acrobatic, Commuter, and Transport Category aircraft; Unmanned Aircraft Systems; Manned Free Balloons; Special Classes of Aircraft; Aircraft Engines; and Propellers*—An applicant is entitled to a type certificate for an aircraft in the normal, utility, acrobatic, commuter, transport or unmanned aircraft system category, a manned free balloon, special classes of aircraft, or an aircraft engine or propeller, if (21.21):

4.7.1 The product qualifies under 4.11 (21.21(a)), or

4.7.2 The applicant submits the type design, test reports, and computations necessary to show that the product to be certificated meets the applicable airworthiness, aircraft noise, fuel venting, and exhaust emission requirements of the Federal Aviation Regulations and any special conditions prescribed by the FAA Administrator, and the Administrator finds (21.21(b)):

(1) Upon examination of the type design, and after completing all tests and inspections that the type design and the product meet the applicable noise, fuel venting, and emissions requirements of the Federal Aviation Regulations, and further finds that they meet the applicable airworthiness requirements of the Federal Aviation Regulations or that any airworthiness provisions not complied with are compensated for by factors that provide an equivalent level of safety (21.21(b)(1)), and

(2) For an aircraft or an unmanned aircraft system, that no feature or characteristic makes it unsafe for the category or class in which certification is requested (21.21(b)(2)).

4.8 *Reserved*—Intentionally left as reserved to correlate to the FAR Structure (21.23).

4.9 *Issuance of Type Certificate: Primary Category Aircraft* (21.24):

4.9.1 The applicant is entitled to a type certificate for an aircraft in the primary category if (21.24(a)):

4.9.1.1 The aircraft (21.24(a)(1)):