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Standard Specification for Aircraft Flight Manual (AFM) for a Small Unmanned Aircraft System (sUAS)[1]

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1. Scope

1.1 This specification provides the minimum requirements for an Aircraft Flight Manual (AFM) for an unmanned aircraft system (UAS) designed, manufactured, and operated in the small UAS (sUAS) category as defined by a nation's Governing Aviation Authority (GAA). Depending on the size and complexity of the sUAS, an AFM may also contain the instruction for maintenance and continuing airworthiness for owner / operator authorized maintenance.

1.2 This specification defines the AFM information that shall be provided by the manufacturer of a sUAS as part of the initial sale or transfer to an end user.

1.3 This specification applies to a sUAS seeking a nation's GAA approval, in the form of flight certificates, airworthiness certificates, type certificates, flight permits, or other like documentation as a sUAS, in the configuration specified in the AFM delivered with the system.

1.4 Any modifications that invalidate or otherwise affect the accuracy of AFM operating instructions shall be approved by the manufacturer and communicated to the regulatory authority in the certificate / permit application.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F2909 Practice for Maintenance and Continued Airworthiness of Small Unmanned Aircraft Systems (sUAS)

F2910 Specification for Design, Construction, and Test of a Small Unmanned Aircraft System (sUAS)

F2911 Practice for Production Acceptance of a Small Unmanned Aircraft System (sUAS)

F3002 Specification for Design of the Command and Control System for Small Unmanned Aircraft Systems (sUAS)

F3003 Specification for Quality Assurance of a Small Unmanned Aircraft System (sUAS)

F3005 Specification for Batteries for Use in Small Unmanned Aircraft Systems (sUAS)

3. Terminology

3.1 *Definitions:*

3.1.1 *basic empty weight (BEW), n*—basic empty weight includes the standard empty weight plus operational and special equipment that has been installed in the unmanned aircraft.

3.1.2 *field maintenance, n*—inspections and repairs made by owners/operators at a remote operating location away from their normal maintenance facility/provider.

3.1.3 *flight training supplement (FTS), n*—additional information provided by the sUAS manufacturer to provide instruction in the proper operation of the system.

3.1.4 *landing area, n*—the total area defined by the manufacturer needed to recover and bring the sUAS to a complete stop from a height of 35 feet above the surface.

3.1.5 *manufacturer, n*—entity responsible for assembly and integration of components and subsystems to create a safe operating sUAS.

3.1.6 *maximum takeoff weight, n*—the maximum allowable weight for takeoff (including payload).

3.1.7 *minimum operating crew (MOC), n*—the minimum operating crew includes the pilot in command, a visual observer (if one is required) and any other required crew member in order to safely operate a specific UAS which includes the make, model and control station specific to that unmanned aircraft.

3.1.8 *model number, n*—a manufacturer-issued unique identifying number or code assigned to each manufactured type of aircraft having the same structural design, components, and standard configuration.

3.1.9 *pre-flight planning, n*—an activity conducted by the pilot and his/her flight crew prior to takeoff to ensure that the flight will be conducted safely and in accordance with all applicable standards and regulations. The activity includes, but is not limited to, such things as checking weather, route of

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

flight, airspace, equipment configuration, support personnel, terrain and communications requirements.

3.1.10 *shall vs. should vs. may, v*—use of the word "shall" implies that a procedure or statement is mandatory and must be followed to comply with this standard, "should" implies recommended, and "may" implies optional at the discretion of the supplier, manufacturer, or operator. Since "shall" statements are requirements, they include sufficient detail needed to define compliance (for example, threshold values, test methods, oversight, reference to other standards). "Should" statements are provided as guidance towards the overall goal of improving safety, and could include only subjective statements. "Should" statements also represent parameters that could be used in safety evaluations, and could lead to development of future requirements. "May" statements are provided to clarify acceptability of a specific item or practice, and offer options for satisfying requirements.

3.1.11 *small unmanned aircraft system (sUAS), n*—composed of the small unmanned aircraft (sUA) and all required on-board subsystems, payload, control station, other required off-board subsystems, any required launch and recovery equipment, and command and control (C2) links between the sUA and the control station. For purposes of this standard sUAS is synonymous with the term small Remotely Piloted Aircraft System (sRPAS) and sUA is synonymous with the term small Remotely Piloted Aircraft (sRPA).

3.1.12 *takeoff area, n*—the total area defined by the manufacturer needed to launch the sUAS to a point where the aircraft is 35 feet above the takeoff surface.

3.2 *Acronyms:*

3.2.1 *AFM*—aircraft flight manual

3.2.2 *AGL*—above ground level

3.2.3 *BEW*—basic empty weight

3.2.4 *IAS*—indicated airspeed

3.2.5 *MOC*—minimum operating crew

3.2.6 *MSL*—mean sea level

4. Applicability

4.1 The purpose of the AFM is to provide guidance to owners, mechanics, pilots, crew members, airports, regulatory officials, and aircraft and component manufacturers who perform or provide oversight of sUAS flight operations.

4.2 For sUAS of a certain size and simplicity, the AFM may also cover instruction for maintenance and continued airworthiness for the minor maintenance, repair, and alteration of sUAS as provided for in section 7.10 of this standard.

4.3 During the design and flight testing of a sUAS the manufacturer shall identify and record those items that are required to be included in the AFM as prescribed in this standard.

4.4 Sections 6 and 7 of this standard serve as templates for manufacturers to structure their AFM.

4.5 This standard is written for all sUAS that are permitted to operate over a defined area and in airspace authorized by a nation's GAA. It is assumed that a visual observer(s) will provide for the sense and avoid requirement to avoid collisions with other aircraft and that the maximum range and altitude at which the sUAS can be flown at will be specified by the nation's GAA. Unless otherwise specified by a nation's GAA this standard applies only to UA that have a maximum take off gross weight of 55 lb/25 kg or less.

5. General Requirements

5.1 The AFM shall provide information in the following areas for a specific model of sUAS:

5.1.1 System description.

5.1.2 Operating characteristics.

5.1.3 Performance and limitations.

5.1.4 Normal, abnormal, and emergency operating procedures.

5.1.5 Installed controls, indicators, equipment, and accessories. This information shall be included through one of the following methods:

5.1.5.1 Instructions for maintenance and continuing airworthiness.

5.1.5.2 Referencing separate component manufacturer provided instructions or manuals.

5.1.5.3 Any combination of 5.1.5.1 and 5.1.5.2.

5.2 The AFM technical content shall be consistent with the data developed in accordance with Practice F2909 and Specifications F2910, F3005, and F3002.

5.3 The AFM shall be structured in accordance with Section 6 of this standard.

5.4 The AFM content shall be in accordance with Section 7 of this standard.

5.5 All revisions, omissions, errors, changes, or updates to the AFM shall be tracked and distributed to all sUAS owners of record in accordance with the quality assurance requirements of Specification F3003.

5.6 The AFM shall present a style, format, and appearance in accordance with accepted government or industry best practices for human readable technical manuals (for example, MIL-STD-3001 "Preparation of Digital Technical Information for Multi-Output Presentation of Technical Manuals"). Additionally, if the AFM is provided in electronic format, it shall conform to common industry or government best practices for readability, indexing, navigation, scrolling and printing.

5.7 All measurements shall be consistent with the equipment and instrumentation installed in the sUAS.

5.8 Flight altitudes shall be barometric altitudes referenced either to MSL or AGL (barometric AGL is barometric altitude measured at the ground location of operation subtracted from the barometric altitude in flight).

5.9 Due to the wide variety in size, weight and system complexity of sUAS, not all items will apply to all systems. Optional items are marked by (O). Components required for the safe operation of the sUAS may not be identified as optional (O) in the AFM. All other items are considered