



Designation: F3366 – 19

# Standard Specification for General Maintenance Manual (GMM) for a small Unmanned Aircraft System (sUAS)<sup>1</sup>

This standard is issued under the fixed designation F3366; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification provides the minimum requirements for a General Maintenance Manual (GMM) for an unmanned aircraft system (UAS) designed, manufactured, and operated in the small UAS category as defined by a Civil Aviation Authority (CAA).

1.2 This specification applies to support professional entities that will receive operator certification by a CAA, and provide standards of practice for self- or third-party audit of operators of UAS.

1.3 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.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

**F2908 Specification for Unmanned Aircraft Flight Manual (UFM) for an Unmanned Aircraft System (UAS)**

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

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F38 on Unmanned Aircraft Systems and is the direct responsibility of Subcommittee F38.03 on Personnel Training, Qualification and Certification.

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

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

**F2911 Practice for Production Acceptance of 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)**

**F3298 Specification for Design, Construction, and Verification of Lightweight Unmanned Aircraft Systems (UAS)**

### 2.2 Federal Standards:<sup>3</sup>

**14 CFR Part 43 Maintenance, Preventive Maintenance, Rebuilding, and Alteration**

**14 CFR Part 107 Small Unmanned Aircraft Systems**

### 2.3 Military Standard:<sup>4</sup>

**MIL-STD-3001 Preparation of Digital Technical Information for Multi-Output Presentation of Technical Manuals**

## 3. Terminology

### 3.1 Definitions:

3.1.1 *applicant/proponent, n*—the person or organization responsible for seeking the approval to operate and operating a UA. The applicant/proponent may be one of the following entities: manufacturer, operator, or original equipment manufacturer.

3.1.1.1 *manufacturer, n*—the person or organization who causes production of a product or article. A manufacturer may also be an operator.

3.1.1.2 *operator, n*—the person or organization who applies for CAA approval to operate a UAS or who seeks operational approval for types of flight operations prohibited by a CAA for that UAS.

3.1.1.3 *original equipment manufacturer (OEM), n*—the person or organization who first produced that product or article. An OEM may also be an operator.

<sup>3</sup> Available from U.S. Government Publishing Office, 732 N. Capitol St., NW, Washington, DC 20401, <http://www.gpo.gov>.

<sup>4</sup> Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

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 *light unmanned aircraft systems, n*—unmanned small aircraft that are approved for operation under the authority of a CAA.

3.1.3.1 *Discussion*—For example, UAS approved to operate by the FAA under 14 CFR Part 107; UAS approved to operate by EASA as Open and Specific Category UA; and UAS approved to operate by CASA as Small, Medium, or Large RPA, or combinations thereof. **F3298**

3.1.4 *model, 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.

3.1.5 *prop rotor, n*—a combination propeller and rotor blade used to generate lift and thrust, but incapable of controlled autorotative flight.

3.1.6 *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 specification; “should” implies recommended; and “may” implies optional at the discretion of the supplier, manufacturer, or operator.

3.1.6.1 *Discussion*—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.

3.1.7 *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.

3.1.7.1 *Discussion*—For purposes of this specification, sUAS is synonymous with the term small Remotely Piloted Aircraft System (sRPAS) and sUA is synonymous with the term small Remotely Piloted Aircraft (sRPA).

3.1.7.2 *Discussion*—Unless otherwise specified by a CAA, the term “sUAS” applies only to UA that have a maximum takeoff gross weight of less than 55 lb (25 kg).

### 3.2 *Acronyms and Abbreviations:*

3.2.1 *AC*—Advisory Circular

3.2.2 *CASA*—Civil Aviation Safety Authority

3.2.3 *EAA*—Experimental Aircraft Association

3.2.4 *EASA*—European Aviation Safety Agency

3.2.5 *FAA*—Federal Aviation Administration

3.2.6 *GMM*—General Maintenance Manual

3.2.7 *RPA*—Remotely Piloted Aircraft

3.2.8 *UA*—Unmanned Aircraft

3.2.9 *UFM*—Unmanned Aircraft Flight Manual

## 4. Applicability

4.1 The purpose of the GMM is to provide guidance to owners, operators, mechanics, pilots, crew members, airports, regulatory officials, and aircraft and component manufacturers; that includes scheduled and unscheduled overhaul, repair, inspection, modification, replacement, and system software upgrades of the sUAS and its components necessary for flight.

4.1.1 For sUAS of a certain size and simplicity, the UFM may also cover instruction for maintenance and continued airworthiness for the minor maintenance, repair, and alteration of sUAS as provided for in Specification **F2908**. An example of size and simplicity includes sUAS that are categorized and labeled by EASA UA Class identification C0, C1, C2.

4.1.2 Sections **6** and **7** of this specification serve as templates for manufacturers to structure their GMM. (See Practice **F2911**.)

4.1.3 Maintenance manuals that do not include all of the minimum requirements of this specification may not be referred to as meeting this specification.

## 5. General Requirements

5.1 The GMM shall provide instructions in the following areas for a specific model of sUAS:

5.1.1 Handling,

5.1.2 Servicing,

5.1.3 Field or preventative maintenance,

5.1.4 Instructions for continued airworthiness, and

5.1.5 Referencing separate component manufacturer provided instructions or manuals.

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

5.3 The GMM shall be structured in accordance with Section **6** of this specification.

5.4 The GMM content shall be in accordance with Section **7** of this specification.

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

5.6 The GMM 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). Additionally, if the GMM is provided in electronic format, it shall conform to common industry or government best practices for readability, indexing, navigation, scrolling, and printing.

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