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Standard Specification for Training and the Development of Training Manuals for the UAS Operator¹

This standard is issued under the fixed designation F3330; 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 (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification defines the requirements for training and the development of training manuals for the unmanned aircraft systems (UAS) operator.

1.2 The specification addresses the requirements or best practices, or both, for documentation and organization of a professional operator (that is, for compensation and hire) for the purposes of internal training programs and for programs offered to the general public.

1.3 This specification supports 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.

1.4 The standard case study used to develop this specification focused on operators of light UAS (below 1320 lb/600 kg as defined by EASA), but the specification may be applied to larger aircraft for using other methods of classification (that is, risk based classes and pilot privileges classes).

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

1.6 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.

1.7 *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.*

1.8 *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.*

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2. Referenced Documents

2.1 ASTM Standards:²

E2521 Terminology for Evaluating Response Robot Capabilities

F2909 Specification for Continued Airworthiness of Lightweight Unmanned Aircraft Systems

F3060 Terminology for Aircraft

F3178 Practice for Operational Risk Assessment of Small Unmanned Aircraft Systems (sUAS)

F3266 Guide for Training for Remote Pilot in Command of Unmanned Aircraft Systems (UAS) Endorsement

F3341/F3341M Terminology for Unmanned Aircraft Systems

2.2 ICAO Standards:³

Doc 9841 Manual on the Approval of Training Organizations

3. Terminology

3.1 *Unique and Common Terminology*—Terminology used in multiple standards is defined in **F3341/F3341M**, UAS Terminology Standard, and **F3060**, Aircraft Terminology Standard. Terminology that is unique to this specification is defined in this section.

3.1.1 *light UAS, n*—an unmanned aircraft system with the unmanned aircraft weighing less than 1320 lb (600 kg). Derived from the EASA definition in harmonized specifications for Light Unmanned Rotorcraft Systems (CS-LURS).

3.1.2 *maintenance manual(s), n*—manual provided by a UAS manufacturer or supplier that specifies all maintenance, repairs, and alterations authorized by the manufacturer.

3.1.3 *operator, n*—any owner of UAS that operates the UAS, that is, uses, causes to use, or authorizes the use of the UAS.

¹ 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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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.

³ Available from International Civil Aviation Organization (ICAO), 999 Robert-Bourassa Blvd, Montréal, Québec H3C 5H7, Canada, <https://www.icao.int>.

3.1.3.1 *Discussion*—In this standard, the connotation is towards an organization, rather than an individual (that is, “company” versus “owner-operator”).

3.2 This standard uses terminology contained within Terminology **E2521**. These terms are not duplicated within this document: omni bucket stand, perch, visual/thermal acuity target, fault.

4. General Requirements

4.1 The applicant shall prepare a program to show how changes to the training manual made by the applicant or by the manufacturers of products and appliances installed in the UAS will be distributed.

4.2 The training manual shall be in the form of a manual or manuals as appropriate for the quantity of data to be provided.

4.3 The format of the manual or manuals shall provide for a practical arrangement.

4.4 The contents of the manual or manuals shall be prepared in the English language or other language acceptable to the certifying authority.

4.5 The training manual shall contain the following manuals or sections, as appropriate, and information described in Sections **5** and **6**.

4.6 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 training manual. All other items are considered mandatory for inclusion. However, if an applicant wishes to exclude a mandatory item, a statement of justification shall be included in the training manual.

5. Structure

- 5.1 Title.
- 5.2 Record of manual revisions (tabular format).
- 5.3 (O) Table of contents.
- 5.4 (O) Introduction.
- 5.5 Organization and Accountability.
- 5.6 Instructor/Staff Development.
- 5.7 Training Programs.
- 5.8 (O) Syllabi.
- 5.9 (O) Tests and Checks.
- 5.10 Recordkeeping.
- 5.11 (O) Safety Management Systems (SMS).
- 5.12 Quality Assurance.
- 5.13 (O) Appendixes.
- 5.14 (O) References.

6. Content

6.1 *Title*—The training manual cover shall provide the following information (decorative covers are allowed if this information is provided on the cover).

- 6.1.1 Publication number,
- 6.1.2 The words ‘Training Manual,’ and
- 6.1.3 Date (show the date of issue).

6.2 *Record of Manual Revisions (Tabular Format)*:

6.2.1 This section shall provide a form on which the operator can note all updates and changes to the TM.

6.2.2 The following statement: “This document was developed following the process, content, and structure defined in ASTM Specification F3330.”

6.3 (O) *Table of Contents*—This section should provide the major headings, paragraphs, and page numbers to assist the operator in finding information in the TM.

6.4 (O) *Introduction*—This section should provide the following information:

6.4.1 A list of the standards and authority having jurisdiction over the operator, and reference compliance with this specification, and

6.4.2 The name and contact information of the operator.

6.5 *Organization and Accountability*—This section should provide the following information:

6.5.1 Management and Key Personnel,

6.5.1.1 Qualifications of Key Personnel,

6.5.1.2 Responsibilities of Management and Key Personnel, and

6.5.1.3 Succession of command of Management.

6.5.2 Operations headquarters, bases, and facilities.

6.5.2.1 General-use facilities, including offices, stores, and archives;

6.5.2.2 (O) Dispatch and flight briefing areas;

6.5.2.3 (O) Library or reference areas;

6.5.2.4 Number and size of classrooms;

6.5.2.5 Location, type, and number of training devices; and

6.5.2.6 Location, type, and number of UAS used for training.

6.5.3 (O) Policies:

6.5.3.1 (O) Use of Maintenance Manuals and Checklists;

6.5.3.2 (O) Weather constraints;

6.5.3.3 (O) Duration of student flight periods.

6.6 *Instructor/Staff Development*—This section shall provide detailed information on the following topics:

6.6.1 Responsible positions or accountable persons, or both, for:

6.6.1.1 Maintenance of performance standards, and

6.6.1.2 Ensuring the competency of personnel.

6.6.2 Procedures to validate the qualifications and determine the competency of instructional personnel as required by Guide **F3266** and standards listed in Section **2**.

6.6.3 Procedures for proficiency checks and upgrade training as required by Guide **F3266** and standards listed in Section **2**.

6.7 *Training Programs*—This section shall provide detailed information on the following topics for each individual UAS training program conducted by the operator, as required by Guide **F3266** and standards listed in Section **2**:

6.7.1 Overarching training plan;

6.7.2 Prerequisites;