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Standard Guide for Core Competencies for Aviation Maintenance Personnel¹

This standard is issued under the fixed designation F3376; 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 The primary purpose of this guide is to address the fundamental subject knowledge, task performance, and task knowledge activities, labeled ‘Core Competencies,’ that ensures the Aircraft Maintenance Technician/Maintenance Engineer (AMT/AME) have the necessary basic knowledge and skills for today’s global aviation maintenance environment. Thus, the ASTM F46 Aerospace Personnel Committee has developed academic and skills knowledge standards that have been developed by aerospace industry-lead working groups. These standards reflect industry best practices and provide a focus on levels of safety that may exceed current regulatory guidance for aircraft maintenance technician academic and skills standards. This guide may supplement a state’s basic general requirements for AMT/AME certification. It is not the intent of this guide to replace the basic or general requirements, but to ensure the AMT/AME is trained on these core competencies to the level as indicated. This guide may be used as a basis for an approval when specifically identified as such by the appropriate governing authority. Parts of this guide may also be referenced by other aerospace personnel groups seeking training, educational, qualification, or certification standards. (See Guide F3245; 14 CFR Part 147; EASA Annex IV, Part 147; NFPA 407; OSHA The Globally Harmonized System for Hazard Communication.)

1.2 An applicant intending to propose this guide as a Means of Compliance for the AMT/AME who works on unmanned aircraft systems (UAS) must seek guidance from their respective oversight authority (that is, published guidance from applicable CAA’s) concerning the acceptable use and application thereof. For information on unmanned aircraft systems, refer to ASTM Committee F38 at www.astm.org/COMMITTEE/F38.htm.

1.3 *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 This guide is under the jurisdiction of ASTM Committee F46 on Aerospace Personnel and is the direct responsibility of Subcommittee F46.01 on Aerospace Engineers and Technicians.

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1.4 *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 The following documents were referenced in the establishment of this guide and users of this guide should refer to the latest revisions available.

2.2 ASTM Standards:²

F2490 Guide for Aircraft Electrical Load and Power Source Capacity Analysis

F3060 Terminology for Aircraft

F3245 Guide for Aircraft Electronics Technician Personnel Certification

2.3 FAA Standards:³

14 CFR Part 1 Definitions and Abbreviations

14 CFR Part 147 Aviation Maintenance Technician Schools AC 43.13-1B Acceptable Methods, Techniques, and Practices – Aircraft Inspection and Repair

AC 43.13-2B Acceptable Methods, Techniques, and Practices – Aircraft Alterations

2.4 Other Standards:

EASA Annex IV, Part 147 Training Organisation Requirements⁴

NFPA 407 Standard for Aircraft Fuel Servicing⁵

OSHA The Globally Harmonized System for Hazard Communication⁶

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 Federal Aviation Administration (FAA), 800 Independence Ave., SW, Washington, DC 20591, <http://www.faa.gov>.

⁴ Available from European Aviation Safety Agency (EASA), Postfach 10 12 53, D-50452 Koeln, Germany, <https://www.easa.europa.eu>.

⁵ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

⁶ Available from Occupational Safety and Health Administration (OSHA), 200 Constitution Ave., NW, Washington, DC 20210, <http://www.osha.gov>.

3. Terminology

3.1 *Definitions*—See 14 CFR Part 1 and Terminology F3060.

3.2 *Explanations for Task Knowledge and Subject Knowledge Levels*—See Table 1.

4. Significance and Use

4.1 This industry-developed standard may be used as a guide in developing AMT/AME curriculum programs to help ensure enhanced knowledge and skill levels for the maintenance technician/engineer in today’s ever-changing and highly technical aviation environment.

5. Knowledge Requirements

5.1 The following subject knowledge areas shall be taught to the levels indicated in Table 1:

5.1.1 *General Safety Practices, Risks, and Hazards*

5.1.1.1 *Occupational Safety and Health, and Environmental Protection Agency – Level 1:*

- (1) OSHA General Duty Clause,
- (2) Employer and employee responsibilities,
- (3) Housekeeping,
- (4) Violations and fines, and
- (5) Protecting the environment.

5.1.1.2 *Ergonomics and Repetitive Motion – Level 2*

5.1.1.3 *Personal Protection and Equipment – Level 2:*

- (1) Noise/hearing protection,
- (2) Hand protection,
- (3) Eye protection,
- (4) Safety shoes, and
- (5) Eye wash stations and showers.

5.1.1.4 *Clothing/Personal Items – Level 2:*

- (1) Proper clothing materials,
- (2) Loose clothing/hair, and
- (3) Wearing of jewelry.

5.1.1.5 *Tool and Equipment Safety – Level 2:*

- (1) Identification and use of common tools;
- (2) General tool handling and safety;

- (3) Hammers and mallets;
 - (4) Screwdrivers;
 - (5) Pliers and cutting tools;
 - (6) Punches;
 - (7) Wrenches, common and specialty;
 - (8) Hand snips;
 - (9) Files;
 - (10) Drill motors and bits;
 - (11) Reamers;
 - (12) Scales, rulers, and squares;
 - (13) Precision measuring tools;
 - (14) Wire stripping tools;
 - (15) Wire crimping tools;
 - (16) Magnifiers;
 - (17) Torque wrenches;
 - (18) Torque calculations for extensions;
 - (19) Tool calibration;
 - (20) Standard periodic calibration;
 - (21) Precision tools - Calibration checks before use;
 - (22) Soldering tools;
 - (23) De-soldering tools;
 - (24) Common hand tool safety;
 - (25) Common powered shop tool safety:
 - (a) Bench grinder;
 - (b) Drill press;
 - (c) Sander, belt, and disk;
 - (d) Lathe;
 - (e) Brake and shear; and
 - (f) Pressurized shop air
- 5.1.1.6 *Lockout and Tagout – Level 1:*
- (1) Aircraft, and
 - (2) Non-aircraft equipment.
- 5.1.1.7 *Fall Protection – Level 1:*
- (1) Proper use of harnesses,
 - (2) Dynamics of a fall, and
 - (3) Suspension trauma.
- 5.1.1.8 *Basic First Aid, CPR, and AED – Level 1*

TABLE 1 Knowledge and Task Levels

LEVEL 1	A familiarization with the principal elements of the subject. Objectives: <ul style="list-style-type: none"> • The student should be familiar with the basic elements of the subject. • The student should be able to give a simple description of the entire subject. • The student should be able to locate methods, procedures, instructions, and reference material. • The student should be able to use typical terms. • No skill demonstration is required under this level.
LEVEL 2	A general knowledge of the theoretical and practical aspects of the subject and an ability to apply that knowledge in a practical manner. Objectives: <ul style="list-style-type: none"> • The student should be able to find and interpret applicable data and information. • The student should be able to give a general description of the subject using, as appropriate, typical examples. • The student should be able to use mathematical formulae in conjunction with physical laws describing the subject. • The student should be able to read and understand sketches, drawings, and schematics describing the subject. • A fundamental skill level is required.
LEVEL 3	A detailed knowledge of theoretical and practical aspects of the subject. To know, understand, and apply facts, principles, theories, and concepts. Objectives: <ul style="list-style-type: none"> • The student should be able to give a detailed description of the subject using theoretical fundamentals and specific examples. • The student should be able to apply their knowledge in a practical manner using manufacturer’s or other acceptable data. • The student should be able to interpret results from various sources and measurements and apply corrective action where appropriate. • Perform all skill operations to a return-to-service standard using appropriate data, tools, and equipment. • The student should be able to perform inspections in accordance with acceptable or approved data. • A high level of skill is required.

5.1.1.9 Electrical Power Safety – Level 1:

- (1) RF Energy;
- (2) Electrical shock, rescue, and first aid;
- (3) Circuit protection devices;
- (4) Elimination/termination of circuit power;
- (5) Microwave energy; and
- (6) Battery safety:
 - (a) Precautions and handling,
 - (b) Lead-acid batteries,
 - (c) Ni-Cad batteries, and
 - (d) Lithium and lithium-ion batteries.

5.1.1.10 Classifications of Fires & Extinguishers – Level 2:

- (1) Identification and use of fire extinguishers,
- (2) Fire triangle and tetrahedron, and
- (3) Types of extinguishing materials.

5.1.1.11 Aircraft Fueling and Fire Safety – Level 2:

- (1) Fueling and defueling operations,
- (2) Fuel types,
- (3) Fueling nozzles,
- (4) Aircraft fueling placards,
- (5) Bonding,
- (6) Grounding,
- (7) Spills—procedures and fire safety,
- (8) Use of personal protective equipment during fueling,

and

- (9) Use of portable electronic devices during fueling operations.

5.1.1.12 High Pressure Systems, Equipment, and Safety – Level 2:

- (1) Fluid, air, hydraulics, oxygen, nitrogen; and
- (2) High pressure fittings:
 - (a) Swaged fittings,
 - (b) Cryogenic fittings, and
 - (c) Servicing safety.

5.1.1.13 Oxygen Systems and Safety – Level 2:

- (1) Clothing,
- (2) Greases and oils,
- (3) Servicing safety, and
- (4) Tools and cleanliness.

5.1.1.14 Foreign Object Debris and Damage (FOD) – Level 2:

- (1) Identification and types of FOD,
- (2) FOD critical areas,
- (3) Tool control, and
- (4) Lost tools and procedures.

5.1.1.15 Specific Chemical Handling and Exposure – Level 2:

- (1) Methyl ethyl ketone,
- (2) Alcohols,
- (3) Safety solvents,
- (4) Fuels and oils,
- (5) Cadmium,
- (6) Asbestos,
- (7) Hexavalent chromium,
- (8) Carbons and dusts, and
- (9) Acids and alkalines.

5.1.1.16 Human Factors in Aviation Maintenance – Level 2:

- (1) Ethics in aviation maintenance,

- (2) Situational awareness,
- (3) Fatigue management,
- (4) Distractions,
- (5) Dirty dozen,
- (6) Active and latent errors,
- (7) Failure to follow procedures,
- (8) Safety management systems, and
- (9) Identifying and mitigating risk.

5.1.1.17 Global Harmonized System, International Classification and Labelling of Chemicals – Level 2:

- (1) Safety data sheets,
- (2) Types of hazardous materials and fluids,
- (3) Chemical handling safety,
- (4) Storage of hazardous materials,
- (5) Labeling of chemicals,
- (6) Shipping of hazardous materials,
- (7) Disposal of hazardous materials, and
- (8) Chemical spills.

5.1.1.18 Aircraft Handling and Line Safety – Level 2:

- (1) Conventional propeller safety,
- (2) Electrically-powered propeller safety:
 - (a) Manned and unmanned aerial vehicles
- (3) Helicopter rotor safety;
- (4) Jet engine inlets and exhaust;
- (5) Common hand signals;
- (6) Towing;
- (7) Brake riders and wing walkers;
- (8) Proper towing speed;
- (9) Tow bar inspection and integrity;
- (10) Proper chocking, braking, and securing of aircraft;
- (11) Mooring and shoring;
- (12) Aircraft jacking; and
- (13) Aircraft and engine covers, and plugs.

5.1.2 Ground Deicing and Anti-Icing – Level 1:

- 5.1.2.1 Types of deicing systems,
- 5.1.2.2 Types of deicing and anti-icing fluid,
- 5.1.2.3 Holdover time tables,
- 5.1.2.4 Visibility charts,
- 5.1.2.5 Fluid application,
- 5.1.2.6 Failed fluid identification, and
- 5.1.2.7 Fluid collection and disposal.

5.1.3 Spill Prevention, Containment, and Control – Level 1:

- 5.1.3.1 Environmental impact of spills,
- 5.1.3.2 Proper spill protocol and cleanup,
- 5.1.3.3 Proper notification in event of a spill, and
- 5.1.3.4 Spill disposal.

5.1.4 Aircraft Structures/Flight Controls
5.1.4.1 Terminology – Level 2:

- (1) Fuselage and components,
- (2) Wings and components,
- (3) Empennage and components,
- (4) Landing gear and components, and
- (5) Zones and stations.

5.1.4.2 Theory of Flight – Level 2:

- (1) Fixed wing and rotor wing;
- (2) Low speed and high-speed aerodynamics;
- (3) Structure bracing, internal and external;
- (4) Streamlining and drag reduction;