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Standard Specification for Systems and Equipment in Aircraft¹

This standard is issued under the fixed designation F3061/F3061M; 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 covers the systems and equipment aspects of airworthiness and design for aircraft. The material was developed through open consensus of international experts in general aviation. This information was created by focusing on Level 1, 2, 3, and 4 Normal Category aeroplanes. The content may be more broadly applicable; it is the responsibility of the Applicant to substantiate broader applicability as a specific means of compliance. The topics covered within this specification are: Basic Information, Electrical Systems, Environmental Requirements, Manual Flight Controls, Automatic Flight Controls, Flight Data and Voice Recording, Hazard Mitigation, Hydraulic Systems, Instrumentation, Mechanical Systems and Equipment, Exterior Lighting, Oxygen Systems, Pneumatic Systems, Lightning Protection, and High-Intensity Radiated Field (HIRF) Protection.

1.2 An applicant intending to propose this information as Means of Compliance for a design approval must seek guidance from their respective oversight authority (for example, published guidance from applicable civil aviation authorities (CAAs) concerning the acceptable use and application thereof. For information on which oversight authorities have accepted this standard (in whole or in part) as an acceptable Means of Compliance to their regulatory requirements (hereinafter “the Rules”), refer to the ASTM Committee F44 web page (www.astm.org/COMMITTEE/F44.htm).

1.3 This document may present information in either SI units, English Engineering units, or both; the values stated in each system may not be exact equivalents. Each system shall be used independently of the other; combining values from the two systems may result in nonconformance with the 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 Following is a list of external standards referenced throughout this specification; the earliest revision acceptable for use is indicated. In all cases later document revisions are acceptable if shown to be equivalent to the listed revision, or if otherwise formally accepted by the governing civil aviation authority; earlier revisions are not acceptable.

2.2 *ASTM Standards:*²

F3060 Terminology for Aircraft

F3083/F3083M Specification for Emergency Conditions, Occupant Safety and Accommodations

F3116/F3116M Specification for Design Loads and Conditions

F3117/F3117M Specification for Crew Interface in Aircraft

F3153 Specification for Verification of Aircraft Systems and Equipment

F3173/F3173M Specification for Aircraft Handling Characteristics

F3179/F3179M Specification for Performance of Aircraft

F3227/F3227M Specification for Environmental Systems in Aircraft

F3228 Specification for Flight Data and Voice Recording in Small Aircraft

F3230 Practice for Safety Assessment of Systems and Equipment in Small Aircraft

F3231/F3231M Specification for Electrical Systems for Aircraft with Combustion Engine Electrical Power Generation

F3232/F3232M Specification for Flight Controls in Small Aircraft

F3233/F3233M Specification for Flight and Navigation Instrumentation in Aircraft

¹ This specification is under the jurisdiction of ASTM Committee F44 on General Aviation Aircraft and is the direct responsibility of Subcommittee F44.50 on Systems and Equipment.

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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.

F3234/F3234M Specification for Exterior Lighting in Small Aircraft

F3236 Specification for High Intensity Radiated Field (HIRF) Protection in Small Aircraft

F3309/F3309M Practice for Simplified Safety Assessment of Systems and Equipment in Small Aircraft

F3316/F3316M Specification for Electrical Systems for Aircraft with Electric or Hybrid-Electric Propulsion

F3367 Practice for Simplified Methods for Addressing High-Intensity Radiated Fields (HIRF) and Indirect Effects of Lightning on Aircraft

F3532 Practice for Protection of Aircraft Systems from Intentional Unauthorized Electronic Interactions

2.3 SAE Standard:³

SAE ARP4754, Rev A Guidelines for Development of Civil Aircraft Systems

2.4 Other Standards:

AC/AMC 20-136 Protection of Aircraft Electrical/Electronic Systems against the Indirect Effects of Lightning⁴

FAA-S-8081-14B, Change 5 Private Pilot Practical Test Standards for Airplane⁴

RTCA DO-178, Rev B Software Considerations in Airborne Systems and Equipment Certification⁵

RTCA DO-254 Design Assurance Guidance for Airborne Electronic Hardware⁵

3. Terminology

3.1 Terminology specific to this standard is provided below. For general terminology, refer to Terminology **F3060**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *closed, adj—in door systems (reference 13.12)*, means the door has been placed within the doorframe in such a position that the latches can be operated to the “latched” condition. Fully closed means the door is placed within the doorframe in the position it will occupy when the latches are in the latched condition.

3.2.2 *continued safe flight and landing, n*—continued safe flight and landing is defined as the capability for continued controlled flight and landing, possibly using emergency procedures, but without requiring pilot skill beyond that needed to pass the Private Pilot Practical Test Standard for Airplane (refer to FAA-S-8081-14B), or requiring pilot forces beyond those defined in Specification **F3173/F3173M**. Landing may occur either at an airport or at an emergency landing location consistent with established emergency procedures. Some aircraft damage may be realized, either during flight or upon landing.

3.2.3 *door, n—in door systems (reference 13.12)*, a movable barrier that is located on the exterior of the fuselage or in the primary pressure vessel on a pressurized aircraft with the

intention to permit access or to enter/exit. The movable barrier must be opened and closed without the use of tools to operate.

3.2.4 *development assurance level, n*—a development assurance level is an indication of the level of those planned and systematic actions used to substantiate, to an adequate level of confidence, that errors in requirements, design, and implementation have been identified and corrected such that the system satisfies the applicable certification basis.

3.2.5 *latched, adj—in door systems (reference 13.12)*, means the latches are fully engaged with their structural counterparts and held in position by the latch operating mechanism.

3.2.6 *latches, n—in door systems (reference 13.12)*, movable mechanical elements that, when engaged, prevent the door from opening.

3.2.7 *locked, adj—in door systems (reference 13.12)*, means the locks are fully engaged.

3.2.8 *locks, n—in door systems (reference 13.12)*, mechanical elements, in addition to the latch operating mechanism, that monitor the latch positions and, when engaged, prevent latches from becoming disengaged.

3.2.9 *pneumatic system elements, n*—components associated with systems that use bleed air or other sources of compressed gas for their function (ice protection, vapor cycle cooling, rudder bias, door seal inflation, brake heating, emergency gear extension, emergency braking, etc.) Within the context of pressurization systems, pneumatic system elements include the valve(s) that regulates cabin inflow as well as all upstream equipment items that utilize bleed air; refer to **3.2.10**.

3.2.10 *pressurization system elements, n*—components downstream of the valve(s) that regulates cabin inflow; refer to **3.2.9**.

3.2.11 *primary function, n*—a primary function is a function that is installed to comply with applicable requirements for a required function and that provides the most pertinent controls or information instantly and directly to the pilot.

3.2.12 *primary system, n*—a primary system is a system that provides a primary function.

3.2.13 *secondary system, n*—a secondary system is a redundancy system that provides the same function as the primary system.

3.2.14 *unsafe system operating condition, n*—an unsafe system operating condition is any system operating condition which, if not detected and properly accommodated by crew action, would cause one or more serious injuries.

4. Basic Information

NOTE 1—The requirements of this chapter are applicable to all systems and equipment installed in the aircraft. These requirements are in addition to and do not supersede any additional system specific requirements identified elsewhere in these design standards or contained in the rules of the governing civil aviation authority.

4.1 Function and Installation:

4.1.1 Each item of installed equipment must be of a kind and design appropriate to its intended function.

³ Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, <http://www.sae.org>.

⁴ Available from Federal Aviation Administration (FAA), 800 Independence Ave., SW, Washington, DC 20591, <http://www.faa.gov>.

⁵ Available from RTCA, 1150 18th NW, Suite 910, Washington, DC 20036, <https://www.rtca.org>.