



Designation: F3117/F3117M – 23a

Standard Specification for Crew Interface in Aircraft¹

This standard is issued under the fixed designation F3117/F3117M; 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 international standards for the crew interface aspects of airworthiness and design for aircraft. “Crew” includes flight crew and maintenance crew. The material was developed through open consensus of international experts in general aviation. This information was created by focusing on 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.

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 CAAs) concerning the acceptable use and application thereof. For information on which oversight authorities have accepted this specification (in whole or in part) as an acceptable Means of Compliance to their regulatory requirements (hereinafter “the Rules”), refer to ASTM Committee F44 web page (<https://www.astm.org/COMMITTEE/F44.htm>).

1.3 *Units*—This document may present information in either SI units, English Engineering units, or both. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

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 Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

F3060 Terminology for Aircraft

F3061/F3061M Specification for Systems and Equipment in Aircraft

F3064/F3064M Specification for Aircraft Powerplant Control, Operation, and Indication

F3116/F3116M Specification for Design Loads and Conditions

F3173/F3173M Specification for Aircraft Handling Characteristics

F3174/F3174M Specification for Establishing Operating Limitations and Information for Aeroplanes

F3179/F3179M Specification for Performance of Aircraft

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

F3233/F3233M Specification for Flight and Navigation Instrumentation in Aircraft

F3235 Specification for Aircraft Storage Batteries

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

2.2 Code of Federal Regulations (CFR):³

14 CFR Part 23 Amendment 62 Airworthiness Standards: Normal Category Airplanes

3. Terminology

3.1 Refer to Terminology F3060.

4. Pilot/Occupant Compartment

4.1 Pilot Compartment:

4.1.1 For each pilot compartment, the compartment and its equipment must allow each pilot to perform flight crew duties without unreasonable concentration or fatigue.

¹ This specification is under the jurisdiction of ASTM Committee F44 on General Aviation Aircraft and is the direct responsibility of Subcommittee F44.10 on General.

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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 U.S. Government Publishing Office (GPO), 732 N. Capitol St., NW, Washington, DC 20401, <http://www.gpo.gov>.

4.1.2 For each pilot compartment, where the flight crew are separated from the passengers by a partition, there must be a means to facilitate two-way communication between flight crew and cabin occupants, such as an opening or openable window or door or other means.

NOTE 1—A single intercom port from passenger compartment to crew may suffice as other means. If an opening is not provided to allow visual verification of occupant compartment conditions, such as Oxygen System status in Specification **F3061/F3061M**, other indication means may be required for other systems.

4.1.3 If communication between flight crew and cabin occupants relies on electrical power, the one-way communication from the flight crew to the cabin occupants must be considered an essential electrical load.

4.2 Pilot Compartment View:

4.2.1 Each pilot compartment must be arranged with sufficiently clear and undistorted view to enable the pilot to safely taxi, takeoff, approach, land, and perform any maneuvers within the operating limitations of the aircraft.

4.2.2 Each pilot compartment must be free from glare and reflections that could interfere with the pilot's vision. Compliance must be shown in all operations for which certification is requested.

4.2.3 Each pilot compartment must be designed so that each pilot is protected from the elements so that moderate rain conditions do not unduly impair the pilot's view of the flight path in normal flight and while landing.

4.2.4 A vision system with a transparent display surface located in the pilot's outside field of view, such as a head up-display, head mounted display, or other equivalent display, must meet the following requirements:

4.2.4.1 While the vision system display is in operation, it must compensate for interference with the pilot's outside field of view such that the combination of what is visible in the display and what remains visible through and around it, enables the pilot to perform the maneuvers specified in **4.2.1** and the pilot compartment to meet the provisions of **4.2.2**.

4.2.4.2 The pilot's view of the external scene must be free of interference, distortion, and glare, that would adversely affect the pilot's normal performance and workload, considering possible distortion both from windscreen or canopy and from transparent display surface.

4.2.4.3 The following tasks associated with the use of the pilot's view must not be degraded below the level of safety that existed without the video imagery:

(1) Detection, accurate identification and maneuvering, as necessary, to avoid traffic, terrain, obstacles, and other hazards of flight.

(2) Accurate identification and utilization of visual references required for every task relevant to the phase of flight.

(3) Although, the vision system image requirements relate primarily to the approach and landing phases of flight, the vision system image when viewed head up during ground operations should not create unacceptable distractions due to sensor proximity to the taxiway surface.

4.2.4.4 When the vision system displays imagery and any symbology referenced to the imagery and outside scene topography, including attitude symbology, flight path vector,

and flight path angle reference cue, that imagery and symbology must be aligned with, and scaled to, the external scene.

4.2.4.5 The vision system must provide a means to allow the pilot using the display to immediately deactivate and reactivate the vision system imagery, on demand, without removing the pilot's hands from the primary flight controls or thrust controls.

4.2.4.6 When the vision system is not in operation, it may not restrict the pilot from performing the maneuvers specified in **4.2.1** and the pilot compartment from meeting the provisions of **4.2.2**.

4.3 *Windshields and Windows*—For Level 4 aeroplanes, the windshield panels in front of the pilots must be arranged so that, assuming the loss of vision through any one panel, one or more panels remain available for use by a pilot seated at a pilot station to permit continued safe flight and landing.

5. Controls – General

5.1 Flight Control Systems Controls:

5.1.1 Each control must operate easily, smoothly, and positively enough to allow proper performance of its functions.

5.1.2 Controls must be arranged and, except where their function is obvious, identified to provide for convenience in operation and to not create confusion and subsequent inadvertent operation.

5.1.3 Airplane aerodynamic flight controls must be designed so that they operate in accordance with the following movement and actuation for aerodynamic controls:

(1) Primary Controls	Motion and effect
Roll	Right (clockwise) for right wing down.
Pitch	Rearward for nose up.
Yaw	Right pedal forward for nose right.
(2) Secondary Controls	
Flaps (or auxiliary lift devices)	Forward or up for flaps up or auxiliary device stowed; rearward or down for flaps down or auxiliary device deployed.
Trim tabs (or equivalent)	Switch motion or mechanical rotation or control to produce similar rotation of the airplane about an axis parallel to the axis control. Axis of roll trim control may be displaced to accommodate comfortable actuation by the pilot. Direction of pilot's hand movement must be in the same sense as airplane response for rudder trim if only a portion of a rotational element is accessible.

5.2 Cockpit Controls:

5.2.1 Each cockpit control must be located and, except where its function is obvious, identified to provide convenient operation and to not create confusion or be prone to inadvertent operation.

5.2.2 The controls must be located and arranged so that the pilot, in the normal seated position in the cockpit, has full and unrestricted movement of each control without interference from either clothing or cockpit structure.

5.2.3 Detents are an acceptable means to establish control positions associated with particular actions.

5.2.4 Powerplant controls must be located:

5.2.4.1 For multiengine airplanes, powerplant controls must be located on the pedestal or overhead at or near the center of the cockpit.

5.2.4.2 For single and tandem seated single-engine airplanes, powerplant controls must be located on the left side of the console or instrument panel.