



Designation: **F3174/F3174M—19 F3174/F3174M – 21**

## Standard Specification for Establishing Operating Limitations and Information for Aeroplanes<sup>1</sup>

This standard is issued under the fixed designation F3174/F3174M; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 1. Scope

1.1 This specification covers airworthiness requirements for establishing general limitations and information to be contained in the aeroplane flight manual. This specification specifies what information shall be provided and does not state how such information shall be presented unless this is necessary for the clarity of the purpose of the specification. Refer to Specification **F3117/F3117M** for means and methods of presentation. 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: Limitations for Airspeed, Weight and Center of Gravity, Auxiliary Power Units, Minimum Flight Crew, Maximum Passenger Seating Configuration, Kinds of Operation, and Maximum Operating Altitude.

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 the ASTM Committee F44 web page ([www.astm.org/COMMITTEE/F44.htm](http://www.astm.org/COMMITTEE/F44.htm)). **Annex A1** maps the Means of Compliance described in this specification to EASA CS-23, amendment 5, or later, and FAA 14 CFR Part 23, amendment 64, or later.

1.3 *Units*—This specification 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 *ASTM Standards:*<sup>2</sup>

**F3060 Terminology for Aircraft**

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee **F44** on General Aviation Aircraft and is the direct responsibility of Subcommittee **F44.20** on Flight. Current edition approved ~~May 1, 2019~~ Dec. 1, 2021. Published ~~May 2019~~ December 2021. Originally approved in 2015. Last previous edition approved in ~~2018~~ 2019 as F3174/F3174M—18—19. DOI: ~~10.1520/F3174\_F3174M-19~~ 10.1520/F3174\_F3174M-21.

<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.

F3082/F3082M Specification for Weights and Centers of Gravity of Aircraft  
F3114 Specification for Structures  
F3116/F3116M Specification for Design Loads and Conditions  
F3117/F3117M Specification for Crew Interface in Aircraft  
F3173/F3173M Specification for Aircraft Handling Characteristics

### **3. Terminology**

3.1 See Terminology **F3060** for definitions and abbreviations.

### **4. Establishing Operating Limitations and Information**

4.1 *General*—Each applicable operating limitation specified in **4.2 – 4.8** and other limitations and information necessary for safe operation shall be established.

4.1.1 The operating limitations and other information necessary for safe operation shall be made available to the crewmembers as prescribed in Specification **F3117/F3117M**.

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## 4.2 *Airspeed Limitations:*

4.2.1 The never-exceed speed,  $V_{NE}$ , shall be established as an operating limitation and shall be so that it is:

4.2.1.1 Not less than 0.9 times the minimum value of  $V_D$  allowed under Specification **F3116/F3116M**, and

4.2.1.2 Not more than the lesser of:

- (1)  $0.9 V_D$  established under Specification **F3116/F3116M**, or
- (2) 0.9 times the maximum speed shown under Specification **F3173/F3173M**, Vibration and Buffering.

4.2.2 The maximum structural cruising speed,  $V_{NO}$ , shall be established as an operating limitation and shall be so that it is:

4.2.2.1 Not less than the minimum value of  $V_C$  allowed under Specification **F3116/F3116M**, and

4.2.2.2 Not more than the lesser of:

- (1)  $V_C$  established under Specification **F3116/F3116M**, or
- (2)  $0.89 V_{NE}$  established under **4.2.1**.

4.2.3 Subsections **4.2.1** and **4.2.2** do not apply to aeroplanes for which a  $V_D/M_D$  is established based on a minimum speed margin between  $V_C/M_C$  and  $V_D/M_D$  under Specification **F3116/F3116M**. For those aeroplanes:

(1) A maximum operating limit speed ( $V_{MO}/M_{MO}$  airspeed or Mach number, whichever is critical at a particular altitude) shall be established as a speed that shall not be deliberately exceeded in any regime of flight (climb, cruise, or descent) unless a higher speed is authorized for flight test or pilot training operations.

(2) The value,  $V_{MO}/M_{MO}$ , shall be established so that it is not greater than the design cruising speed,  $V_C/M_C$ .

(3) The value,  $V_{MO}/M_{MO}$ , shall be established so that it is sufficiently below  $V_D/M_D$ , or  $V_{DF}/M_{DF}$  for jets, and the maximum speed shown under Specification **F3173/F3173M**, Vibration and Buffering, to make it highly improbable that the latter speeds will be inadvertently exceeded in operations.

(4) The speed margin between  $V_{MO}/M_{MO}$  and  $V_D/M_D$ , or  $V_{DF}/M_{DF}$  for jets, shall not be less than that determined under Specification **F3116/F3116M**, Design Dive Speed.

(5) The speed margin between  $V_{MO}/M_{MO}$  and  $V_D/M_D$ , or  $V_{DF}/M_{DF}$  for jets, shall not be less than the speed margin found necessary in the flight tests conducted under Specification **F3173/F3173M**, speed increase and recovery characteristics.

4.2.4 The maximum operating maneuvering speed,  $V_O$ , shall be established as an operating limitation and is a selected speed that is not greater than  $v_s \sqrt{n}$  established in Specification **F3116/F3116M**, Design Maneuvering Speed.

4.2.5 The flap extended speed,  $V_{FE}$ , shall be established as an operating limitation and shall be so that it is:

4.2.5.1 Not less than the minimum value of  $V_F$  allowed in Specification **F3116/F3116M**, High Lift Devices, and

4.2.5.2 Not more than  $V_F$  established under Specification **F3116/F3116M**, High Lift Devices.

4.2.5.3 Additional combinations of flap setting, airspeed, and engine power may be established if the structure has been proven for the corresponding design conditions.

4.2.6 The minimum control speed,  $V_{MC}$ , determined under Specification **F3173/F3173M** shall be established as an operating limitation.

4.3 *Weight and Center of Gravity*—The weight and center of gravity limitations determined under Specification **F3082/F3082M**, Load Distribution Limits, shall be established as operating limitations.

4.4 *Auxiliary Power Unit Limitations*—If an auxiliary power unit is installed, the limitations established for the auxiliary power unit shall be specified in the operating limitations for the aeroplane.

4.5 *Minimum Flight Crew*—The minimum flight crew shall be established as an operating limitation and shall be so that it is sufficient for safe operation considering:

4.5.1 The workload on individual crewmembers,

4.5.2 The accessibility and ease of operation of necessary controls by the appropriate crewmember, and

4.5.3 The kinds of operation authorized under 4.7.

4.5.4 In addition, for Level 4 aeroplanes, each crewmember workload determination shall consider the following:

- (1) Flight path control,
- (2) Collision avoidance,
- (3) Navigation,
- (4) Communications,
- (5) Operation and monitoring of all essential aeroplane systems,
- (6) Command decisions, and
- (7) The accessibility and ease of operation of necessary controls by the appropriate crewmember during all normal and emergency operations when at the crewmember flight station.

4.6 *Maximum Passenger Seating Configuration*—The maximum passenger seating configuration shall be established as an operating limitation.

4.7 *Kinds of Operation*—The kinds of operation authorized (for example, VFR, IFR, day or night) and the meteorological conditions (for example, icing) to which the operation of the aeroplane is limited or from which it is prohibited shall be established as operating limitations and shall be appropriate to the installed equipment.

4.8 *Maximum Operating Altitude:*

4.8.1 The maximum altitude up to which operation is allowed, as limited by flight, structural, powerplant, functional or equipment characteristics, shall be established as an operating limitation.

4.8.2 For pressurized aeroplanes, a maximum operating altitude limitation of not more than 7620 m [25 000 ft] shall be established unless compliance with Specification F3114, Windshields and Windows for operation above this altitude is shown.

## 5. Keywords

5.1 aeroplane; aeroplane flight manual; airworthiness design requirement

## ANNEX

### (Mandatory Information)

#### A1. CORRELATION OF STANDARD – CONTENT AND THE RULES

**A1.1 Means of Compliance Correlation Sorted by Standard Section (Table A1.1), by FAA 14 CFR Part 23 Rule (Table A1.2), and by EASA CS-23 Rule (Table A1.3)**

NOTE A1.1—The Specification sections shown in the Specification column will be at the highest level at which everything below that level is the same as the level shown.

**TABLE A1.1 Means of Compliance Correlation Sorted by Standard Section**

Standard	Rev	Section	Subpart	14 CFR Part 23	Subpart	CS-23
F3174/F3174M	19	<u>4.1</u>	G	23.2620(a)(1)	B	23.2170(a)(1)
F3174/F3174M	19	<u>4.1.1</u>	G	23.2620(a)(1)	G	23.2620(a)
F3174/F3174M	19	<u>4.2</u>	G	23.2620(a)(1)	B	23.2170(a)(1)
F3174/F3174M	19	<u>4.3</u>	G	23.2620(a)(1)	B	23.2170(a)(1)
F3174/F3174M	19	<u>4.4</u>	G	23.2620(a)(1)	E	23.2445(a)
F3174/F3174M	19	<u>4.5</u>	G	23.2620(a)(1)	B	23.2170(a)(1)
F3174/F3174M	19	<u>4.6</u>	G	23.2620(a)(1)	B	23.2170(a)(1)
F3174/F3174M	19	<u>4.7</u>	G	23.2620(a)(1)	B	23.2170(a)(1)
F3174/F3174M	19	<u>4.8</u>	G	23.2620(a)(1)	B	23.2170(a)(1)

**TABLE A1.2 Means of Compliance Correlation Sorted by FAA 14 CFR Part 23 Rule**

Subpart	14 CFR Part 23	Standard	Rev	Section
G	23.2620(a)(1)	F3174/F3174M	19	<u>4.1</u>
G	23.2620(a)(1)	F3174/F3174M	19	<u>4.2</u>
G	23.2620(a)(1)	F3174/F3174M	19	<u>4.3</u>
G	23.2620(a)(1)	F3174/F3174M	19	<u>4.4</u>
G	23.2620(a)(1)	F3174/F3174M	19	<u>4.5</u>
G	23.2620(a)(1)	F3174/F3174M	19	<u>4.6</u>
G	23.2620(a)(1)	F3174/F3174M	19	<u>4.7</u>
G	23.2620(a)(1)	F3174/F3174M	19	<u>4.8</u>

**TABLE A1.3 Means of Compliance Correlation Sorted by EASA CS-23 Rule**

Subpart	CS-23	Standard	Rev	Section
B	23.2170(a)(1)	F3174/F3174M	19	<u>4.1</u>
B	23.2170(a)(1)	F3174/F3174M	19	<u>4.2</u>
B	23.2170(a)(1)	F3174/F3174M	19	<u>4.3</u>
B	23.2170(a)(1)	F3174/F3174M	19	<u>4.5</u>
B	23.2170(a)(1)	F3174/F3174M	19	<u>4.6</u>
B	23.2170(a)(1)	F3174/F3174M	19	<u>4.7</u>
B	23.2170(a)(1)	F3174/F3174M	19	<u>4.8</u>
E	23.2445(a)	F3174/F3174M	19	<u>4.4</u>
G	23.2620(a)	F3174/F3174M	19	<u>4.1.1</u>

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## APPENDIXES

(Nonmandatory Information)

### X1. REMOVED WITH F3174/F3174M – 18

### X2. CHANGE HISTORY

#### X2.1 Change History from F3174/F3174M – 15 to – 18

X2.1.1 *Reason for Revision*—Alignment with 14 CFR Part 23, Amendment 64 and EASA CS 23 Amdt. 5, Update of references and simplification of language.

X2.1.2 *Detailed Changes*:

X2.1.2.1 Section 1.1 through 1.3: Update to match F44 Standards Editorial Guide 2017-02.

X2.1.2.2 Section 2.1: New reference for F3082/F3082M added. Update of titles.