Designation: F3174/F3174M – 15

Standard Specification for Establishing Operating Limitations and Information for Aeroplanes[1]

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 reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification establishes the airworthiness design requirements associated with the establishment of operating limitations and information for the operation of aeroplanes. It covers the need 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 for means and methods of presentation.

1.2 The applicant for a design approval shall seek the individual guidance of their respective civil aviation authority (CAA) body concerning the use of this specification as part of a certification plan. For information on which CAA regulatory bodies have accepted this specification (in whole or in part) as a means of compliance to their small aeroplane airworthiness regulations (hereinafter referred to as "the Rules"), refer to ASTM Committee F44 webpage (www.ASTM.org/COMITTEE/F44.htm), which includes CAA website links.

1.3 This specification is applicable to small aeroplanes.

1.4 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.5 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F3060 Terminology for Aircraft

F3114 Specification for Structures

F3116 Specification for Design Loads and Conditions

F3117 Specification for Crew Interface in Aircraft

F3173 Specification for Handling Characteristics of Aeroplanes

2.2 *European Aviation Safety Agency Regulations:*[3]

CS-23 Certification Specifications for Normal, Utility, Aerobatic, and Commuter Category Aeroplanes (Amendment 3)

CS-VLA Certification Specifications for Very Light Aeroplanes (Amendment 1)

2.3 *U.S. Code of Federal Regulations:*[4]

14 CFR Part 23 Airworthiness Standards: Normal, Utility, Aerobatic and Commuter Category Airplanes (Amendment 62)

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 – 4.11 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.

[1] 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.

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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 the European Aviation Safety Agency, https://www.easa.europa.eu/regulations.

[4] Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, http://www.access.gpo.gov.

4.2 *Airspeed Limitations:*

4.2.1 The never-exceed speed, V_{NE}, shall be established so that it is:

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

4.2.1.2 Not more than the lesser of:

(1) 0.9 V_D established under Specification F3116, or

(2) 0.9 times the maximum speed shown under Specification F3173, Section 8.

4.2.2 The maximum structural cruising speed, V_{NO}, shall be such that $V_{Cmin} \leq V_{NO} \leq V_C$, with V_{Cmin} and V_C established as under Specification F3116.

4.2.3 Subsections 4.2.1 and 4.2.2 do not apply when V_D/M_D is established under Specification F3116. 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 may 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, and so that it is sufficiently below V_D/M_D, or V_{DF}/M_{DF}, and the maximum speed shown under Specification F3173, Section 8 to make it highly improbable that the latter speeds will be inadvertently exceeded in operations.

(3) The speed margin between V_{MO}/M_{MO} and V_D/M_D, or V_{DF}/M_{DF}, may not be less than that determined under Specification F3116, subsection 5.1.2 or the speed margin found necessary in the flight tests conducted under Specification F3173, subsection 9.1.

4.3 *Operating Maneuvering Speed*—The maximum operating maneuvering speed, V_O, shall be established as an operating limitation. The value, V_O, is a selected speed that is not greater than V_A established in Specification F3116.

4.4 *Flap Extended Speed:*

4.4.1 The flap extended speed, V_{FE}, shall be established so that it is:

4.4.1.1 Not less than the minimum value of V_F allowed in Specification F3116, subsection 4.8.2, and

4.4.1.2 Not more than V_F established under Specification F3116, subsections 4.8.1, 4.8.3, and 4.8.4.

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

4.5 *Minimum Control Speed*—The minimum control speed, V_{MC}, determined under Specification F3173, subsection 3.5, shall be established as an operating limitation.

4.6 *Weight and Center of Gravity*—The weight and center of gravity limitations determined under 23.23 shall be established as operating limitations.

4.7 *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.

4.8 *Minimum Flight Crew*—The minimum flight crew shall be established so that it is sufficient for safe operation considering:

4.8.1 The workload on individual crewmembers,

4.8.2 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.

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

4.8.4 The kinds of operation authorized under 4.10.

4.9 *Maximum Passenger Seating Configuration*—The maximum passenger seating configuration shall be established.

4.10 *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 appropriate to the installed equipment.

4.11 *Maximum Operating Altitude:*

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

4.11.2 A maximum operating altitude limitation of not more than 7620 m [25 000 ft] shall be established for pressurized aeroplanes unless compliance with Specification F3114, subsection 4.7.4 is shown.

5. Keywords

5.1 aeroplane; aeroplane flight manual; airworthiness design requirement

APPENDIX

(Nonmandatory Information)

X1. DIFFERENCES FROM PART/CS 23 AND CS-VLA

X1.1 In Table X1.1, the changes are listed to Part 23 Amdt 62, CS 23 Amdt. 1 and CS-VLA 226 Amdt. 1 language and new requirements with rationale for the differences.

TABLE X1.1 Changes to Part 23 Amdt 62, CS 23 Amdt. 1 and CS-VLA Amdt. 1 Language and New Requirements

Source	Original	Revised	Rationale
General	References to original Part/CS 23 sections	Reference to ASTM Standards	Required for ASTM F44 setup
23.1505 (b)	(b) The maximum structural cruising speed V_{NO} shall be established so that it is: (1) Not less than the minimum value of VC allowed under §23.335 and (2) Not more than the lesser of: (i) VC established under §23.335 or (ii) 0.89 VNE established under paragraph (a) of this section.	4.2.2 The maximum structural cruising speed, V_{NO}, shall be such that $V_{Cmin} \leq V_{NO} \leq V_C$, with V_{Cmin} and V_C established as under Specification F3116, Section 5.1.1 (23.335) [23.1505(b)].	Simplified language proposed by the group.
23.1507	Operating maneuvering speed. The maximum operating maneuvering speed, V_O, shall be established as an operating limitation. V_O is a selected speed that is not greater than $VS\sqrt{n}$ established in §23.335(c).	4.3 Operating Maneuvering Speed (23.1507)—The maximum operating maneuvering speed, V_O, shall be established as an operating limitation. The value, V_O, is a selected speed that is not greater than VA established in specification F3116 , Paragraph 5.1.3 [23.335(c)] (23.1507).	Simplified language proposed as the group thinks that VA is typically $VS\sqrt{n}$.
CS-VLA	None	4.8 Minimum flight crew	Level 1 aeroplanes cover more than former VLA assumptions; additional burden for classic VLA aeroplanes is negligible.
CS-VLA	None	4.9 Maximum passenger seating configuration.	Not a burden for classic VLA aeroplanes.
CS-VLA	None	4.11 Maximum operating altitude	Not a burden for classic VLA aeroplanes.