Certification Specifications for Normal-Category Aeroplanes

(CS-23)

and

Acceptable Means of Compliance and Guidance Material to the Certification Specifications for Normal-Category Aeroplanes

(AMC & GM to CS-23)

CS-23 Amendment 6 / AMC & GM to CS-23 Issue 4

27 February 2023[1]

[1] For the date of entry into force of this Amendment, kindly refer to Decision 2023/002/R in the Official Publication of the Agency.

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ED Decision 2017/013/R

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The following is a list of paragraphs affected by this amendment:

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The following is a list of paragraphs affected by this amendment:

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The following is a list of paragraphs affected by this amendment:

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ED Decision 2010/008/R

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The following is a list of paragraphs affected by this amendment:

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207 Paragraph 23.959	Amended (Editorial correction)
208 Paragraph 23.961	Amended (Editorial correction)

307 Paragraph 23.1329	Amended (Editorial correction)

ED Decision 2009/001/R

Amendment 1

The following is a list of paragraphs affected by this amendment:

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CS 23.562(d)	Created (NPA 2008-08)
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PREAMBLE AMC & GM TO CS-23

ED Decision 2023/002/R

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ED Decision 2020/006/R

Issue 3

The following is a list of paragraphs affected by this issue:

GM 23.2500(b)	Created

ED Decision 2019/020/R

Issue 2

The following is a list of paragraphs affected by this issue:

GM1 CS-23.2010	Created
GM2 CS-23.2010	Amended
AMC1 CS-23 Subpart B through G. (ASTM F3264-18b Standard Specification for Normal Category Aeroplanes Certification)	Amended
AMC2 CS-23 Subpart B through G. (CS-23 Amendment 4)	Amended
AMC3 CS-23 Subpart B through G. (CS-VLA Amendment 1)	Amended

SUBPART A — GENERAL

CS 23.2000 Applicability and definitions

(a) This Certification Specification prescribes airworthiness standards for the issuance of type certificates, and changes to those certificates, for aeroplanes in the normal category.

(b) For the purposes of this Certification Specification, the following definition applies:

'Continued safe flight and landing' means an aeroplane is capable of continued controlled flight and landing, possibly using emergency procedures, without requiring exceptional pilot skill or strength. Upon landing, some aeroplane damage may occur as a result of a failure condition.

AMC1 23.2000 Applicability

The applicability of the acceptable means of compliance (AMC) is limited to the scope of CS-23 (Amendment 5 and later). The applicability of the individual AMC that are provided in Subpart B through G can be restricted to a specific type of design, type of operation or any other criterion. The applicability of each AMC is therefore specified within that AMC. Demonstration of compliance using a published AMC outside of that applicability does not provide for presumption of compliance with the related requirement.

CS 23.2005 Certification of normal-category aeroplanes

(a) Certification in the normal category applies to aeroplanes with a passenger seating configuration of 19 or less and a maximum certified take-off mass of 8 618 kg (19 000 pounds) or less.

(b) Aeroplane certification levels are:

(1) Level 1 — for aeroplanes with a maximum seating configuration of 0 to 1 passengers;

(2) Level 2 — for aeroplanes with a maximum seating configuration of 2 to 6 passengers;

(3) Level 3 — for aeroplanes with a maximum seating configuration of 7 to 9 passengers; and

(4) Level 4 — for aeroplanes with a maximum seating configuration of 10 to 19 passengers.

(c) Aeroplane performance levels are:

(1) Low speed — for aeroplanes with a V_{NO} or $V_{MO} \leq 250$ knots calibrated airspeed (KCAS) or a $M^{MO} \leq 0.6$; and

(2) High speed — for aeroplanes with a V_{NO} or $V_{MO} > 250$ KCAS or an $M_{MO} > 0.6$.

(d) Aeroplanes not certified for aerobatics may be used to perform any manoeuvre incident to normal flying, including:

(1) stalls (except whip stalls); and

(2) lazy eights, chandelles, and steep turns, in which the angle of bank is not more than 60 degrees.

(e) Aeroplanes certified for aerobatics may be used to perform manoeuvres without limitations, other than those limitations established under Subpart G.

CS 23.2010 Accepted means of compliance

(a) An applicant must comply with this CS using an acceptable means of compliance (AMC) issued by EASA, or another means of compliance which may include consensus standards, when specifically accepted by EASA.

(b) An applicant requesting EASA to accept a means of compliance must provide the means of compliance to EASA in an acceptable form and manner.

GM1 23.2010 Accepted means of compliance

For compliance demonstration, applicants will use the issue of the AMC & GM which is current on the date of application, as reflected in the certification programme for the certification basis determined by EASA.

This current issue, however, does not automatically invalidate the previous and later issues of the AMC & GM to CS-23 Issue 3, unless this is specifically identified as such in the AMC & GM. Applicants can, therefore, agree with EASA in the certification programme to use such previous issues of the AMC & GM to demonstrate compliance with the certification basis.

Whenever an earlier AMC is no longer considered to be acceptable for the demonstration of compliance, the restrictions on its use will be stated in a remark on the specific line of that CS and the related AMC. In particular, AMC2&3 to CS-23/CS-VLA Subpart B to Subpart G (which reflect respectively CS-23 Amendment 4 and CS-VLA Amendment 1) will not be updated to cover new technologies or methods. However, they are still accepted as means of compliance. EASA will restrict their use in the AMC only when they no longer appropriately address new safety concerns or the associated safety levels.

[AMC&GM to CS-23: Issue 3]

[AMC&GM to CS-23: Issue 4]

GM2 23.2010 Accepted means of compliance

The AMC to certification specifications (CS) for Normal-Category Aeroplanes (CS-23 Amendment 5 and later) illustrate means, but not the only means, by which a requirement contained in CS-23 can be met. Satisfactory demonstration of compliance using the AMC shall provide for presumption of compliance with the related requirement. The AMC are a way to facilitate certification tasks for the applicant and the competent authority. Due to changes in technology or application of technology in a way that has not been considered or not (yet) included in the AMC, the appropriate application of this AMC in the certification of a design requires a review by the authority.

CS-23 Amendment 5 and later maintains the existing level of safety of CS-23 Amendment 4 and CS-VLA Amendment 1, except for areas addressing loss of control and icing, for which the safety level was increased. Achieving this level of safety through compliance with CS-23 Amendment 5 and later for a given certification project may require the use of additional means of compliance beyond those provided in this AMC, depending on the details of the specific design.

Applicants may propose designs with novel or unusual features for which neither AMC1 nor the EASA Certification Specifications (CS-23 Amendment 4 and CS-VLA Amendment 1) contains appropriate AMC for showing compliance with CS-23 Amendment 5 and later. Therefore, applicants proposing the use of this AMC to CS-23 as a means of complying with CS-23 Amendment 5 and later for aeroplanes with novel or unusual design features may need to gain acceptance of additional means of compliance under CS 23.2010.

AMC1 CS-23 Subpart B through Subpart G contains means of compliance that consist of a listing of consensus standards at their specific revisions that have been reviewed by EASA and accepted as AMC to CS-23. The scope and content of the referenced consensus standard can, however, differ from the overall scope of CS-23 or the objectives of the requirement. Therefore, using such a referenced consensus standard requires the applicant to identify what is applicable within that consensus standard and to seek agreement with the authority for agreement of the selected consensus standard and applied paragraphs. This is the so-called building-block flexibility that is built into the CS-23.

The listing in AMC1 Subpart B through Subpart G is consistent with the administrative ASTM standard F3264 at the revision as specified. The AMC1 is therefore basically a copy of ASTM F3264, except when it is considered necessary to include or exclude specific standards. If applicable this is explained by a remark.

When EASA has established that there is the need to deviate from some of the content of a specific referenced consensus standard in order to meet the level of safety of CS-23 Amendment 5, this is also stated in a remark in this AMC to CS-23.

AMC2 CS-23 Subpart B through Subpart G contains means of compliance that refer to the previous Amendment 4 of CS-23. These AMC are included for the (administrative) convenience of both the applicant and EASA when using an existing certification basis. AMC2 in Sections B through G identify which CS-23 Amendment 4 requirements contain an accepted demonstration of compliance with the requirement. This AMC2 CS-23 Subpart B through Subpart G is applicable for fixed wing aeroplanes with a passenger-seating configuration of 19 or less and a maximum certificated take-off mass of 8 618 kg (19 000 pounds) or less.

Before the entry into force of Amendment 5 of CS-23, CS-23 was included in the certification basis that often required complementing special conditions (refer to point 21.A.16B of Part 21[1]) when the certification specification did not contain adequate or appropriate safety standards for the product. These special conditions can be applied to complement AMC2 when required.

AMC3 CS-23 Subpart B through Subpart G contains means of compliance that refer to the previous Amendment 1 of CS-VLA. These AMC are included for the (administrative) convenience of both the applicant and EASA when using an existing certification basis. AMC3 that are provided in Sections B through G identify which CS-VLA Amendment 1 requirement(s) contain an accepted demonstration of compliance with the requirement. This AMC3 CS-23 Subpart B through Subpart G is applicable to aeroplanes with a single engine (spark- or compression-ignition) having not more than two seats, with a maximum certificated take-off weight of not more than 750 kg and a stalling speed in the landing

[1] Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 224, 21.8.2012, p. 1). http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1473415871666&uri=CELEX:32012R0748

configuration of not more than 83 km/h (45 knots)(CAS), to be approved for day VFR only. This AMC3 is applicable for non-aerobatic operations including:

— any manoeuvre incident to normal flying;

— stalls (except whip stalls); and

— lazy eights, chandelles, and steep turns, in which the angle of bank is not more than 60°.

Before the entry into force of Amendment 5 of CS-23, CS-VLA was included in the certification basis that often required complementing special conditions (refer to point 21.A.16B in Part 21) when the certification specification did not contain adequate or appropriate safety standards for the product. These special conditions can be applied to complement AMC3 when required.

Availability of referenced consensus standards

The referenced consensus standard documents are available from their issuing standards body:

— ASTM documents may be purchased from:

ASTM International
100 Barr Harbor Drive, PO Box C700
West Conshohocken, Pennsylvania
19428-2959, USA
(Website: www.astm.org)

[AMC&GM to CS-23: Issue 3]

[AMC&GM to CS-23: Issue 4]

GM3 23.2010 Accepted means of compliance

The following table provides an overview of the ASTM International Technical Committee F44 (hereinafter 'ASTM F44') consensus standards that are included in AMC1 as an acceptable means of compliance with CS-23. It also gives the revision number of the ASTM consensus standards as changed between Issue 3 and Issue 4 of the AMC1 to CS-23.

	AMC & GM to CS-23 Issue 4 (ED Decision 2023/002/R)	AMC & GM to CS-23 Issue 3 (ED Decision 2020/006/R)
ASTM consensus standard number and title	**ASTM consensus standard revision**	**ASTM consensus standard revision**
F2490 Standard Guide for Aircraft Electrical Load and Power Source Capacity	20	05
F3061/F3061M Standard Specification for Systems and Equipment in Small Aircraft	20	17
F3062/F3062M Standard Specification for Aircraft Powerplant Installation	20	18
F3063/F3063M Standard Specification for Aircraft Fuel Storage and Delivery	20	18a
F3064/F3064M Standard Specification for Aircraft Powerplant Control, Operation, and Indication	21	18a
F3065/F3065M Standard Specification for Aircraft Propeller System Installation	21a	18
F3066/F3066M Standard Specification for Aircraft Powerplant Installation Hazard Mitigation	18	18
F3082/F3082M Standard Specification for Weights and Centers of Gravity of Aircraft	17	17
F3083/F3083M Standard Specification for Emergency Conditions, Occupant Safety and Accommodations	20a	16
F3093/F3093M Standard Specification for Aeroelasticity Requirements	21	15
F3114 Standard Specification for Structures	21	15
F3115/F3115M Standard Specification for Structural Durability for Small Aeroplanes	20	15

	AMC & GM to CS-23 Issue 4 (ED Decision 2023/002/R)	AMC & GM to CS-23 Issue 3 (ED Decision 2020/006/R)
ASTM consensus standard number and title	**ASTM consensus standard revision**	**ASTM consensus standard revision**
F3116/F3116M Standard Specification for Design Loads and Conditions	18e2	18
F3117/F3117M Standard Specification for Crew Interface in Aircraft	20	18b
F3120/F3120M Standard Specification for Ice Protection for General Aviation Aircraft	20	15
F3173/F3173M Standard Specification for Aircraft Handling Characteristics	21	17
F3174/F3174M Standard Specification for Establishing Operating Limitations and Information for Aeroplanes	19	18
F3179/F3179M Standard Specification for Performance of Aircraft	20	18
F3180/F3180M Standard Specification for Low-Speed Flight Characteristics of Aircraft	21	18
F3227/F3227M Standard Specification for Environmental Systems in Aircraft	21	17
F3228 Standard Specification for Flight Data and Voice Recording in Small Aircraft	17	17
F3229/F3229M Standard Practice for Static Pressure System Tests in Small Aircraft	17	17
F3230 Standard Practice for Safety Assessment of Systems and Equipment in Small Aircraft	20a	17
F3231/F3231M Standard Specification for Electrical Systems for Aircraft with Combustion Engine Electrical Power Generation	21	17
F3232/F3232M Standard Specification for Flight Controls in Small Aircraft	20	17
F3233/F3233M Standard Specification for Instrumentation in Small Aircraft	21	17
F3234/F3234M Standard Specification for Exterior Lighting in Small Aircraft	17	17
F3235 Standard Specification for Aircraft Storage Batteries	17a	17a

	AMC & GM to CS-23 Issue 4 (ED Decision 2023/002/R)	AMC & GM to CS-23 Issue 3 (ED Decision 2020/006/R)
ASTM consensus standard number and title	**ASTM consensus standard revision**	**ASTM consensus standard revision**
F3236 Standard Specification for High Intensity Radiated Field (HIRF) Protection in Small Aircraft	17	17
F3254 Standard Specification for Aircraft Interaction of Systems and Structures	19	N/a
F3309/F3309M Standard Practice for Simplified Safety Assessment of Systems and Equipment in Small Aircraft	21	18
F3331 Standard Practice for Aircraft Water Loads	18	18
F3380 Standard Practice for Structural Compliance of Very Light Aeroplanes	19	N/a
F3396/F3396M Standard Practice for Aircraft Simplified Loads Criteria	20	N/a
F3408/F3408M Standard Specification for Aircraft Emergency Parachute Recovery Systems	21	N/a
F3432 Standard Practice for Powerplant Instruments	20a	N/a

[AMC&GM to CS-23: Issue 4]

SUBPART B — FLIGHT

CS 23.2100 Mass and centre of gravity

(a) The applicant must determine limits for mass and centre of gravity that provide for the safe operation of the aeroplane.

(b) The applicant's design must comply with each requirement of this Subpart at critical combinations of mass and centre of gravity within the aeroplane's range of loading conditions using acceptable tolerances.

(c) The condition of the aeroplane at the time of determining its empty mass and centre of gravity must be well defined and easily repeatable.

AMC1 23.2100 Mass and centre of gravity

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.1 Weight/Mass and Centre of Gravity:

5.1.1 F3082/F3082M-17 Standard Specification for Weights and Centers of Gravity of Aircraft

5.1.2 F3114-21 Standard Specification for Structures

[AMC&GM to CS-23: Issue 4]

AMC2 23.2100 Mass and centre of gravity

CS-23 Amdt 4

23.21 Proof of compliance
23.23 Load distribution limits
23.25 Weight limits
23.29 Empty weight and corresponding center of gravity
23.31 Removable ballast
23.871 Levelling means

AMC3 23.2100 Mass and centre of gravity

CS VLA Amdt 1

VLA.21 Proof of compliance
VLA.23 Load distribution limits
VLA.25 Weight limits
VLA.29 Empty weight and corresponding center of gravity
VLA.871 Levelling means

CS 23.2105 Performance data

(a) Unless otherwise prescribed, an aeroplane must meet the performance requirements of this Subpart in:

(1) still air and standard atmospheric conditions at sea level for all aeroplanes; and

(2) ambient atmospheric conditions within the operating envelope for:

(i) Level-1 high-speed and Level-2 high-speed aeroplanes; and

(ii) Level-3 and Level-4 aeroplanes.

(b) Unless otherwise prescribed, the applicant must develop the performance data required by this Subpart for the following conditions:

(1) airport altitudes from sea level to 3 048 m (10 000 ft); and

(2) temperatures above and below standard day temperature that are within the range of operating limitations if those temperatures could have a negative effect on performance.

(c) The procedures used for determining take-off and landing distances must be executable consistently by pilots of average skill in atmospheric conditions expected to be encountered in service.

(d) Performance data determined in accordance with CS 23.2105(b) must account for losses due to atmospheric conditions, cooling needs, and other demands on power sources.

AMC1 23.2105 Performance data

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.2 Performance Data

F3179/F3179M-20 Standard Specification for Performance of Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2105 Performance data

CS-23 Amdt 4

23.45 Performance - General

AMC3 23.2105 Performance data

CS VLA Amdt 1

VLA.45 Performance - General

CS 23.2110 Stall speed

The applicant must determine the aeroplane stall speed or the minimum steady flight speed for each flight configuration used in normal operations, including take-off, climb, cruise, descent, approach, and landing. The stall speed or minimum steady flight speed determination must account for the most adverse conditions for each flight configuration.

AMC1 23.2110 Stall speed

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.3 Stall Speed

F3179/F3179M-20 Standard Specification for Performance of Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2110 Stall speed

CS-23 Amdt 4

23.49 Stalling speed

AMC3 23.2110 Stall speed

CS VLA Amdt 1

VLA.49 Stalling speed

CS 23.2115 Take-off performance

(a) The applicant must determine aeroplane take-off performance accounting for:

(1) stall speed safety margins;

(2) minimum control speeds; and

(3) climb gradients.

(b) For single-engine aeroplanes and Levels 1, 2, and 3 low-speed multi-engine aeroplanes, take-off performance includes the determination of ground roll and initial climb distance to 15 m (50 ft) above the take-off surface.

(c) For high-speed multi-engine aeroplanes of Levels 1, 2, and 3, and for all Level-4 multi-engine aeroplanes, take-off performance includes a determination of the following distances after a sudden critical loss of thrust:

(1) an aborted take-off at critical speed;

(2) ground roll and initial climb to 11 m (35 ft) above the take-off surface; and

(3) net take-off flight path.

AMC1 23.2115 Take-off performance

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.4 Take-off Performance

F3179/F3179M-20 Standard Specification for Performance of Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2115 Take-off performance

CS-23 Amdt 4

23.51 Takeoff speeds
23.53 Takeoff performance
23.55 Accelerate-stop distance
23.57 Takeoff path
23.59 Takeoff distance and takeoff run
23.61 Takeoff flight path

AMC3 23.2115 Take-off performance

CS VLA Amdt 1

VLA.51 Takeoff speeds

CS 23.2120 Climb requirements

The design must comply with the following minimum climb performance out of ground effect:

(a) with all engines operating and in the initial climb configuration(s):

(1) for Level-1 and -2 low-speed aeroplanes, a climb gradient of 8.3 % for landplanes and 6.7 % for seaplanes and amphibians; and

(2) for Level-1 and -2 high-speed aeroplanes and all Level-3 and -4 aeroplanes, a climb gradient at take-off of 4 %.

(b) after a critical loss of thrust on multi-engine aeroplanes:

(1) for Level-1 and -2 low-speed aeroplanes that do not meet single-engine crashworthiness requirements, a climb gradient of 1.5 % at a pressure altitude of 1 524 m (5 000 ft) in the cruise configuration;

(2) for Level-1 and -2 high-speed aeroplanes, and Level-3 low-speed aeroplanes, a 1 % climb gradient at 122 m (400 ft) above the take-off surface with the landing gear retracted and flaps in the take-off configuration; and

(3) for Level-3 high-speed aeroplanes and all Level-4 aeroplanes, a 2 % climb gradient at 122 m (400 ft) above the take-off surface with the landing gear retracted and flaps in the approach configuration;

(c) a climb gradient of 3 % during balked landing, without creating undue pilot workload, with the landing gear extended and flaps in the landing configuration(s).

AMC1 23.2120 Climb requirements

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.5 Climb Requirements

F3179/F3179M-20 Standard Specification for Performance of Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2120 Climb requirements

CS-23 Amdt 4

23.63 Climb: General
23.65 Climb: All engines operating

AMC3 23.2120 Climb requirements

CS-VLA Amdt 1

CS VLA.65 'Climbs': All engines operating

Remarks

To demonstrate compliance with CS 23.2120, the climb gradient should be determined, using F3179M-20 'Standard Specification for Performance of Aircraft'.

[AMC&GM to CS-23: Issue 4]

CS 23.2125 Climb information

(a) The applicant must determine, as applicable, climb and/or descent performance:

(1) for all engines operating;

(2) following a critical loss of thrust on take-off; and

(3) after a critical loss of thrust, during the en route phase of flight.

AMC1 23.2125 Climb information

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.6 Climb Information

F3179/F3179M-20 Standard Specification for Performance of Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2125 Climb information

CS-23 Amdt 4

23.66 Takeoff climb: one engine inoperative
23.67 Climb: One engine inoperative
23.69 En route climb/descent
23.71 Glide: single engine airplanes

AMC3 23.2125 Climb information

None

CS 23.2130 Landing

The applicant must determine the following, for standard temperatures at critical combinations of mass and altitude within the operational limits:

(a) the distance, starting from a height of 15 m (50 ft) above the landing surface, required to land and come to a stop; and

(b) the approach and landing speeds, configurations, and procedures, which allow a pilot of average skill to land within the published landing distance consistently and without causing damage or injury, and which allow for a safe transition to the balked-landing conditions.

AMC1 23.2130 Landing

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.7 Landing

F3179/F3179M-20 Standard Specification for Performance of Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2130 Landing

CS-23 Amdt 4

23.73 Reference landing approach speed
23.75 Landing distance
23.77 Balked landing

AMC3 23.2130 Landing

CS VLA Amdt 1

VLA.75 Landing distance
VLA.77 Balked landing

CS 23.2135 Controllability

(a) The aeroplane must be controllable and manoeuvrable, without requiring exceptional piloting skills, alertness, or strength, within the operating envelope:

(1) at all loading conditions for which certification is requested;

(2) during all phases of flight;

(3) with likely reversible flight control or propulsion system failure; and

(4) during configuration changes.

(b) The aeroplane must be able to make a safe landing, using the steepest approved approach gradient procedures and providing a reasonable safe margin below V_{REF} or above the approach angle of attack.

(c) V_{MC} is the calibrated airspeed at which, following the sudden critical loss of thrust, it is possible to maintain control of the aeroplane. For multi-engine aeroplanes, the applicant must determine V_{MC}, if applicable, for the most critical configurations used in take-off and landing operations.

(d) If the applicant requests certification of an aeroplane for aerobatics, the applicant must demonstrate those aerobatic manoeuvres for which certification is requested and determine entry speeds.

[CS-23: Amdt 6]

AMC1 23.2135 Controllability

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.8 Controllability

F3173/F3173M-21 Standard Specification for Aircraft Handling Characteristics

[AMC&GM to CS-23: Issue 4]

AMC2 23.2135 Controllability

CS-23 Amdt 4

23.141 Flight Characteristics -General
23.143 Controllability and Manoeuvrability - General
23.145 Longitudinal control
23.147 Directional and lateral control
23.149 Minimum control speed
23.151 Acrobatic manoeuvres
23.153 Control during landings
23.155 Elevator control force in manoeuvres
23.157 Rate of roll

AMC3 23.2135 Controllability

CS VLA Amdt 1

VLA.141 Flight Characteristics -General
VLA.143 Controllability and Manoeuvrability - General
VLA.145 Longitudinal control
VLA.153 Control during landings
VLA.155 Elevator control force in manoeuvres
VLA.157 Rate of roll

CS 23.2140 Trim

(a) The aeroplane must maintain lateral and directional trim without further force upon, or movement of, the primary flight controls or corresponding trim controls by the pilot, or the flight control system, under the following conditions:

(1) for Level-1, -2, and -3 aeroplanes, in cruise;

(2) for Level-4 aeroplanes, in normal operations.

(b) The aeroplane must maintain longitudinal trim without further force upon, or movement of, the primary flight controls or corresponding trim controls by the pilot, or the flight control system, under the following conditions:

(1) climb,

(2) level flight,

(3) descent,

(4) approach.

(c) Residual control forces must not fatigue or distract the pilot during normal operations of the aeroplane and likely abnormal or emergency operations, including a critical loss of thrust on multi-engine aeroplanes.

AMC1 23.2140 Trim

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.9 Trim

F3173/F3173M-21 Standard Specification for Aircraft Handling Characteristics

[AMC&GM to CS-23: Issue 4]

AMC2 23.2140 Trim

CS-23 Amdt 4

23.161 Trim

AMC3 23.2140 Trim

CS VLA Amdt 1

VLA.161 Trim

CS 23.2145 Stability

(a) Aeroplanes not certified for aerobatics must:

(1) have static longitudinal, lateral, and directional stability in normal operations;

(2) have dynamic short period and Dutch roll stability in normal operations; and

(3) provide stable control feedback throughout the operating envelope.

(b) No aeroplane may exhibit any divergent longitudinal stability characteristic so unstable as to increase the pilot's workload or otherwise endanger the aeroplane and its occupants.

AMC1 23.2145 Stability

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.10 Stability

F3173/F3173M-21 Standard Specification for Aircraft Handling Characteristics

[AMC&GM to CS-23: Issue 4]

AMC2 23.2145 Stability

CS-23 Amdt 4

23.171 Stability – General
23.173 Static longitudinal stability
23.175 Demonstration of static longitudinal stability
23.177 Static directional and lateral stability
23.181 Dynamic stability

AMC3 23.2145 Stability

CS VLA Amdt 1

VLA.171 Stability – General
VLA.173 Static longitudinal stability
VLA.175 Demonstration of static longitudinal stability
VLA.177 Static directional and lateral stability
VLA.181 Dynamic stability

CS 23.2150 Stall characteristics, stall warning, and spins

(a) The aeroplane must have controllable stall characteristics in straight flight, turning flight, and accelerated turning flight with a clear and distinctive stall warning that provides sufficient margin to prevent inadvertent stalling. A stall warning that is mutable for aerobatic flight phases is acceptable.

(b) Single-engine aeroplanes, not certified for aerobatics, must not have a tendency to hazardously depart from controlled flight inadvertently.

(c) Level-1 and -2 multi-engine aeroplanes, not certified for aerobatics, must not have a tendency to hazardously depart controlled flight inadvertently from thrust asymmetry after a critical loss of thrust.

(d) Aeroplanes certified for aerobatics that include spins must have controllable stall characteristics and the ability to recover within one and one-half additional turns after initiation of the first control action from any point in a spin, not exceeding six turns or any greater number of turns for which certification is requested, while remaining within the operating limitations of the aeroplane.

(e) Aeroplanes intended for aerobatics have the ability to recover from any approved manoeuvre, without exceeding limitations or exhibiting unsafe characteristics.

AMC1 23.2150 Stall characteristics, stall warning, and spins

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.11 Stall Characteristics, Stall Warning, and Spins

F3180/F3180M-21 Standard Specification for Low-Speed Flight Characteristics of Aircraft

Remarks

F3180-21 should be applied instead of F3180-19 that is referenced in F3264-21.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2150 Stall characteristics, stall warning, and spins

CS-23 Amdt 4

23.201 Wings level stall
23.203 Turning Flight and accelerated turning stalls
23.207 Stall Warning
23.221 Spinning

Remarks

CS 23.2150(b) and (c) are not covered by this AMC2. Applicants may use the provision in ASTM F3180-21 to show compliance with CS 23.2150.

[AMC&GM to CS-23: Issue 4]

AMC3 23.2150 Stall characteristics, stall warning, and spins

CS VLA Amdt 1

VLA.201 Wings level stall
VLA.203 Turning Flight and accelerated turning stalls
VLA.207 Stall Warning
VLA.221 Spinning

Remarks

VLA.221(a) is not accepted as AMC to 23.2150 only VLA.221(b) can be used.

CS 23.2155 Ground- and water-handling characteristics

(a) The aeroplane has controllable longitudinal and directional handling characteristics during taxi, take-off, and landing for the anticipated operation.

AMC1 23.2155 Ground- and water-handling characteristics

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.12 Ground and Water Handling Characteristics:

F3173/F3173M-21 Standard Specification for Aircraft Handling Characteristics

[AMC&GM to CS-23: Issue 4]

AMC2 23.2155 Ground- and water-handling characteristics

CS-23 Amdt 4

23.231 Longitudinal stability and control
23.233 Directional stability and control
23.235 Operation on unpaved surfaces
23.237 Operation on water
23.239 Spray characteristics

AMC3 23.2155 Ground- and water-handling characteristics

CS VLA Amdt 1

VLA.231 Longitudinal stability and control
VLA.233 Directional stability and control
VLA.235 Operation on unpaved surfaces
VLA.239 Spray characteristics

CS 23.2160 Vibration, buffeting, and high-speed characteristics

(a) Vibration and buffeting, for operations up to V_D/M_D, must not interfere with the control of the aeroplane or cause excessive fatigue to the flight crew. Stall warning buffet within these limits is allowable.

(b) For high-speed aeroplanes and all aeroplanes with a maximum operating altitude greater than 7 625 m (25 000 ft) pressure altitude, there must be no perceptible buffeting in cruise configuration at 1 g and at any speed up to V_{MO}/M_{MO}, except stall buffeting.

(c) For high-speed aeroplanes, the applicant must determine the positive manoeuvring load factors at which the onset of perceptible buffet occurs in the cruise configuration within the operational envelope. Likely inadvertent excursions beyond this boundary must not result in structural damage.

(d) High-speed aeroplanes must have recovery characteristics that do not result in structural damage or loss of control, beginning at any likely speed up to V_{MO}/M_{MO}, following:

(1) an inadvertent speed increase; and

(2) a high-speed trim upset for aeroplanes where dynamic pressure can impair the longitudinal trim system operation.

AMC1 23.2160 Vibration, buffeting, and high-speed characteristics

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.13 Vibration, Buffeting, and High-Speed Characteristics

F3173/F3173M-21 Standard Specification for Aircraft Handling Characteristics

[AMC&GM to CS-23: Issue 4]

AMC2 23.2160 Vibration, buffeting, and high-speed characteristics

CS-23 Amdt 4

23.251 Vibration and buffeting
23.253 High-speed characteristics

AMC3 23.2160 Vibration, buffeting, and high-speed characteristics

CS VLA Amdt 1

VLA.251 Vibration and buffeting

CS 23.2165 Performance and flight characteristics requirements for flight in icing conditions

(a) An applicant who requests certification for flight in icing conditions must show the following in the icing conditions for which certification is requested under normal operation of the ice protection system(s):

(1) comply with each requirement of this Subpart, except those applicable to spins and any that must be demonstrated at speeds in excess of:

(i) 250 knots calibrated airspeed (KCAS);

(ii) V_{MO} or M_{MO} or V_{NE}; or

(iii) a speed at which the applicant demonstrates the airframe will be free of ice accretion;

(2) the means by which stall warning is provided to the pilot for flight in icing conditions and non-icing conditions is the same.

(b) If an applicant requests certification for flight in icing conditions, the applicant must provide a means to detect any icing conditions for which certification is not requested and demonstrate the aeroplane's ability to avoid or exit those conditions.

(c) The applicant must develop an operating limitation to prohibit intentional flight, including take-off and landing, into icing conditions for which the aeroplane is not certified to operate.

AMC1 23.2165 Performance and flight characteristics requirements for flight in icing conditions

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.14 Performance and Flight Characteristics Requirements for Flight in Icing Conditions

F3120/F3120M-20 Standard Specification for Ice Protection for General Aviation Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2165 Performance and flight characteristics requirements for flight in icing conditions

CS-23 Amdt 4

23.1419 Ice Protection

Following the cancellation of Federal Aviation Administration (FAA) Advisory Circular (AC)-1419-2D, applicants should now use AMC1 23.2165.

[AMC&GM to CS-23: Issue 4]

AMC3 23.2165 Performance and flight characteristics requirements for flight in icing conditions

None

FLIGHT INFORMATION

CS 23.2170 Operating limitations

(a) The following flight information is established:

(1) operating limitations, procedures and instructions necessary for the safe operation of the aeroplane; and

(2) essential speed and performance information.

AMC1 23.2170 Operating limitations

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

5.15 Operating Limitations

F3174/F3174M-19 Standard Specification for Establishing Operating Limitations and Information for Aeroplanes

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2170 Operating limitations

CS-23 Amdt 4

23.1501 General
23.1505 Airspeed limitations
23.1507 Manoeuvring speed
23.1511 Flap extended speed
23.1513 Minimum control speed
23.1519 Weight and centre of gravity
23.1527 Maximum operating altitude

AMC3 23.2170 Operating limitations

CS VLA Amdt 1

VLA.1501 General
VLA.1505 Airspeed limitations
VLA.1507 Manoeuvring speed
VLA.1511 Flap extended speed
VLA.1519 Weight and centre of gravity

SUBPART C — STRUCTURES

CS 23.2200 Structural design envelope

The applicant must determine the structural design envelope, which describes the range and limits of aeroplane design and operational parameters for which the applicant will show compliance with the requirements of this Subpart. The applicant must account for all aeroplane design and operational parameters that affect structural loads, strength, durability, and aeroelasticity, including:

(a) structural design airspeeds to be considered when determining the corresponding manoeuvring and gust loads must:

(1) be sufficiently greater than the stalling speed of the aeroplane to safeguard against loss of control in turbulent air; and

(2) provide sufficient margin for the establishment of practical operational limiting airspeeds.

(b) flight load conditions to be expected in service;

(c) mass variations and distributions over the applicable mass and centre of gravity envelope, within the operating limitations;

(d) loads in response to all designed control inputs; and

(e) redistribution of loads if deflections under load would significantly change the distribution of external or internal loads.

AMC1 23.2200 Structural design envelope

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.1 Structural Design Envelope

F3116/F3116M-18e2 Standard Specification for Design Loads and Conditions

F3396/F3396M-20 Standard Practice for Aircraft Simplified Loads Criteria

[AMC&GM to CS-23: Issue 4]

AMC2 23.2200 Structural design envelope

CS-23 Amdt 4

23.321(b), (c) Flight Loads - General
23.333(a), (b), (d) Flight envelope
23.335 Design airspeeds
23.337 Limit manoeuvring load factors
23.341 Gust load factors

AMC3 23.2200 Structural design envelope

CS VLA Amdt 1

VLA.321 Flight Loads - General
VLA.333 Flight envelope
VLA.335 Design airspeeds
VLA.337 Limit manoeuvring load factors
VLA.341 Gust load factors

CS 23.2205 Interaction of systems and structures

For aeroplanes equipped with systems that affect structural performance, either directly or as a result of failure or malfunction, the applicant must account for the influence and failure conditions of these systems when showing compliance with the requirements of this Subpart.

AMC1 23.2205 Interaction of systems and structures

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.2 Interaction of Systems and Structure

F3254-19 Standard Specification for Aircraft Interaction of Systems and Structures

[AMC&GM to CS-23: Issue 4]

AMC2 23.2205 Interaction of systems and structures

None

Remarks

Provision not included in CS 23 Amdt 4

AMC3 23.2205 Interaction of systems and structures

None

Remarks

Provision not included in CS VLA Amdt 1

STRUCTURAL LOADS

CS 23.2210 Structural design loads

(a) The applicant must:

(1) determine structural design loads resulting from likely externally or internally applied pressure, force or moment which may occur in flight, ground and water operations, ground- and water- handling, and while the aeroplane is parked or moored;

(2) determine the loads required by CS 23.2210(a)(1) at all critical combinations of parameters, on and within the boundaries of the structural design envelope; and

(3) the magnitude and distribution of these loads must be based on established physical principles within the structural design envelope.

AMC1 23.2210 Structural-design loads

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.3 Structural Design Loads

F3116/F3116M-18e2 Standard Specification for Design Loads and Conditions

F3396/F3396M-20 Standard Practice for Aircraft Simplified Loads Criteria

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2210 Structural-design loads

CS-23 Amdt 4

23.301(b), (c), (d) Loads (*With Appendix A*)
23.321(a) Flight Loads - General
23.343 Design fuel loads
23.345 High lift devices
23.471 Ground Loads - General
23.473 Ground load conditions and assumptions
23.507 Jacking loads
23.509 Towing loads
23.511 Ground load: unsymmetrical loads on multiple-wheel units
23.521 Water load conditions
23.523 Design weights and center of gravity positions
23.525 Application of loads
23.527 Hull and main float load factors (*With Appendix I*)
23.537 Seawing loads
23.753 Main float Design

AMC3 23.2210 Structural-design loads

CS VLA Amdt 1

VLA.301 Loads (*With Appendix A*)
VLA.321 Flight Loads - General
VLA.345 High lift devices
VLA.471 Ground Loads - General
VLA.473 Ground load conditions and assumptions
VLA.521 Water load conditions

CS 23.2215 Flight load conditions

(a) Critical flight loads are established for symmetrical and asymmetrical loading from all combinations of airspeeds and load factors at and within the boundaries of the manoeuvre and gust envelope:

(1) at each altitude within the operating limitations, where the effects of compressibility are taken into account when significant;

(2) at each mass from the design minimum mass to the design maximum mass; and

(3) at any practical but conservative distribution of disposable load within the operating limitations for each altitude and weight.

(b) Vibration and buffeting does not result in structural damage up to dive speed.

(c) Flight loads resulting from a likely failure of an aeroplane system, component, or engine are determined.

AMC1 23.2215 Flight load conditions

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.4 Flight Load Conditions

F3116/F3116M-18e2 Standard Specification for Design Loads and Conditions

F3396/F3396M-20 Standard Practice for Aircraft Simplified Loads Criteria

[AMC&GM to CS-23: Issue 4]

AMC2 23.2015 Flight load conditions

CS-23 Amdt 4

23.331 Symmetrical flight conditions
23.333(c) Flight envelope
23.347 Unsymmetrical flight loads
23.349 Rolling conditions
23.351 Yawing conditions
23.367 Unsymmetrical loads due to engine failure

AMC3 23.2015 Flight load conditions

CS VLA Amdt 1

VLA.331 Symmetrical flight conditions
VLA.333 Flight envelope
VLA.347 Unsymmetrical flight loads
VLA.349 Rolling conditions
VLA.351 Yawing conditions

CS 23.2220 Ground and water load conditions

The applicant must determine the structural design loads resulting from taxi, take-off, landing, and handling conditions on the applicable surface in normal and adverse attitudes and configurations.

AMC1 23.2220 Ground and water load conditions

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.5 Ground and Water Load Conditions

F3116/F3116M-18e2 Standard Specification for Design Loads and Conditions

F3331-18 Standard Practice for Aircraft Water Loads

[AMC&GM to CS-23: Issue 4]

AMC2 23.2220 Ground and water load conditions

CS-23 Amdt 4

23.477 Landing gear arrangement (*With Appendix C*)
23.479 level landing conditions (*With Appendix C, D*)
23.481 Tail down landing conditions
23.483 One-wheel landing conditions
23.485 Side load conditions
23.493 Braked roll conditions
23.505 Supplementary conditions for skiplanes
23.529 Hull and main float landing conditions
23.531 Hull and main float takeoff conditions
23.731 Wheels

AMC3 23.2220 Ground and water load conditions

CS VLA Amdt 1

VLA.477 Landing gear arrangement (*With Appendix C*)
VLA.479 level landing conditions
VLA.481 Tail down landing conditions
VLA.483 One-wheel landing conditions
VLA.485 Side load conditions
VLA.493 Braked roll conditions

VLA.505 Supplementary conditions for skiplanes
VLA.731 Wheels

CS 23.2225 Component loading conditions

(a) The applicant must determine the loads acting upon all relevant structural components, in response to:

(1) interaction of systems and structures;

(2) structural design loads;

(3) flight load conditions; and

(4) ground and water load conditions.

(b) The complete pressurised cabin, including doors, windows, canopy and valves, is exposed as a pressure vessel for the maximum relief valve setting multiplied by a factor of 1.33, without considering other loads.

AMC1 23.2225 Component loading conditions

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.6 Component Loading Conditions

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3232/F3232M-20 Standard Specification for Flight Controls in Small Aircraft

F3116/F3116M-18e2 Standard Specification for Design Loads and Conditions

F3396/F3396M-20 Standard Practice for Aircraft Simplified Loads Criteria

[AMC&GM to CS-23: Issue 4]

AMC2 23.2225 Component loading conditions

CS-23 Amdt 4

23.302 Canard or tandem wing configurations
23.361 Engine torque
23.363 Side load on engine mount
23.365 Pressurized cabin loads
23.369 Rear lift truss
23.371 Gyroscopic and aerodynamic loads
23.373 Speed control devices
23.391 Control surface loads
23.393 Loads parallel to hinge line
23.395 Control system loads
23.397 Limit control forces and torques
23.399 Dual control system
23.405 Secondary control system
23.407 Trim tab effects
23.409 Tabs

23.415 Ground gust conditions
23.421 Balancing loads
23.423 Manoeuvring loads
23.425 Gust loads
23.427 Unsymmetrical loads
23.441 Manoeuvring loads
23.443 Gust loads
23.445 Outboard fins or winglets
23.455 Ailerons
23.459 Special devices
23.497 Supplementary conditions for tail wheels
23.499 Supplementary conditions for nose wheels
23.533 Hull and main float bottom pressures (*With Appendix I*)
23.535 Auxiliary float loads
23.659 Mass Balance

AMC3 23.2225 Component loading conditions

CS VLA Amdt 1

VLA.361 Engine torque
VLA.363 Side load on engine mount
VLA.369 Rear lift truss
VLA.373 Speed control devices
VLA.391 Control surface loads (*With Appendix B*)
VLA.395 Control system loads
VLA.397 Limit control forces and torques
VLA.399 Dual control system
VLA.405 Secondary control system
VLA.407 Trim tab effects
VLA.409 Tabs
VLA.415 Ground gust conditions
VLA.421 Balancing loads (*With Appendix B*)
VLA.423 Manoeuvring loads (*With Appendix B*)
VLA.425 Gust loads
VLA.427 Unsymmetrical loads
VLA.441 Manoeuvring loads (*With Appendix B*)
VLA.443 Gust loads (*With Appendix B*)
VLA.445 Outboard fins or winglets
VLA.447 Combined loads on tail surfaces
VLA.449 Additional loads applicable to V-tails
VLA.455 Ailerons (*With Appendix B*)
VLA.457 Wing flaps
VLA.459 Special devices
VLA.497 Supplementary conditions for tail wheels
VLA.499 Supplementary conditions for nose wheels
VLA.659 Mass Balance

CS 23.2230 Limit and ultimate loads

(a) Unless special or other factors of safety are necessary to meet the requirements of this Subpart, the applicant must determine:

(1) the limit loads, which are equal to the structural design loads; and

(2) the ultimate loads, which are equal to the limit loads multiplied by a 1.5 factor of safety, unless otherwise provided.

(b) Some strength specifications are specified in terms of ultimate loads only, when permanent detrimental deformation is acceptable.

AMC1 23.2230 Limit and ultimate loads

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.7 Limit and Ultimate Loads

F3114-21 Standard Specification for Structures

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2230 Limit and ultimate loads

CS-23 Amdt 4

23.301(a) Loads
23.303 Factors of safety

AMC3 23.2230 Limit and ultimate loads

CS VLA Amdt 1

VLA.301 Loads
VLA.303 Factors of safety

STRUCTURAL PERFORMANCE

CS 23.2235 Structural strength

The structure must support:

(a) limit loads without:

(1) interference with the safe operation of the aeroplane; and

(2) detrimental permanent deformation.

(b) ultimate loads.

AMC1 23.2235 Structural strength

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.8 Structural Strength

F3114-21 Standard Specification for Structures

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2235 Structural strength

CS-23 Amdt 4

23.305 Strength and deformation
23.307 Proof of structure
23.641 Proof of strength - Wings
23.651 Proof of strength - Control surfaces
23.659 Mass Balance
23.681 (a) Limit load static tests - Control System
23.723 Shock absorption tests
23.725 Limit drop tests
23.726 Ground load dynamic tests
23.727 Reserve energy absorption drop tests
23.729(a) Landing gear extension and retraction system
23.737 Skis
23.843(a) Pressurization tests
23.1435(a)(1) Hydraulic Systems

AMC3 23.2235 Structural strength

CS VLA Amdt 1

VLA.305 Strength and deformation
VLA.307 Proof of structure
VLA.641 Proof of strength - Wings
VLA.651 Proof of strength - Control surfaces

VLA.659 Mass Balance
VLA.681 Limit load static tests - Control System
VLA.723 Shock absorption tests
VLA.725 Limit drop tests
VLA.726 Ground load dynamic tests
VLA.727 Reserve energy absorption drop tests
VLA.729 Landing gear extension and retraction system
VLA.737 Skis
VLA.1436 Hydraulic manually-powered brake systems

CS 23.2240 Structural durability

(a) The applicant must develop and implement inspections or other procedures to prevent structural failures due to foreseeable causes of strength degradation, which could result in serious or fatal injuries, or extended periods of operation with reduced safety margins. Each of the inspections or other procedures developed under CS 23.2240 must be included in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness required by CS 23.2625.

(b) For Level-4 aeroplanes, the procedures developed for compliance with CS 23.2240(a) must be capable of detecting structural damage before the damage could result in structural failure.

(c) For pressurised aeroplanes:

(1) the aeroplane must be capable of continued safe flight and landing following a sudden release of cabin pressure, including sudden releases caused by door and window failures;

(2) for aeroplanes with maximum operating altitude greater than 12 497 m (41 000 ft), the procedures developed for compliance with CS 23.2240(a) must be capable of detecting damage to the pressurised cabin structure before the damage could result in rapid decompression that would result in serious or fatal injuries.

(d) The aeroplane must be designed to minimise hazards to the aeroplane due to structural damage caused by high-energy fragments from an uncontained engine or rotating-machinery failure.

AMC1 23.2240 Structural durability

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.9 Structural Durability & 9.11 Equipment Containing High-Energy Rotors

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

F3115/F3115M-20 Standard Specification for Structural Durability for Small Aeroplanes

F3380-19 Standard Practice for Structural Compliance of Very Light Aeroplanes

F3116/F3116M-18e2 Standard Specification for Design Loads and Conditions

[AMC&GM to CS-23: Issue 4]

AMC2 23.2240 Structural durability

CS-23 Amdt 4

23.571 Metallic pressurized cabin structures
23.572 Metallic wing, empennage, and associated structures
23.573 Damage tolerance and fatigue evaluation of structure
23.574 Metallic damage tolerance and fatigue evaluation of commuter category airplanes
23.575 Inspections and other procedures
23.627 Fatigue strength
23.1461 Equipment containing high-energy rotors

AMC3 23.2240 Structural durability

CS VLA Amdt 1

VLA.572 Metallic wing, empennage, and associated structures
VLA.627 Fatigue strength

CS 23.2245 Aeroelasticity

(a) The aeroplane must be free from flutter, control reversal, and divergence:

(1) at all speeds within and sufficiently beyond the structural design envelope;

(2) for any configuration and condition of operation;

(3) accounting for critical degrees of freedom; and

(4) accounting for any critical failures or malfunctions.

(b) The applicants' design must account for tolerances for all quantities that affect flutter.

AMC1 23.2245 Aeroelasticity

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.10 Aeroelasticity

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3093/F3093M-21 Standard Specification for Aeroelasticity Requirements

[AMC&GM to CS-23: Issue 4]

AMC2 23.2245 Aeroelasticity

CS-23 Amdt 4

23.629 Flutter
23.687 Spring devices
23.677(c) Trim systems

AMC3 23.2245 Aeroelasticity

CS VLA Amdt 1

VLA.629 Flutter
VLA.687 Spring devices
VLA.677 Trim systems

CS 23.2250 Design and construction principles

(a) Each part, article, and assembly must be designed for the expected operating conditions of the aeroplane.

(b) Design data must adequately define the part, article, or assembly configuration, its design features, and any materials and processes used.

(c) The suitability of each design detail and part having an important bearing on safety in operations must be determined.

(d) The control system must be free from jamming, excessive friction, and excessive deflection when the aeroplane is subjected to expected limit air loads.

(e) Doors, canopies, and exits must be protected against inadvertent opening in flight, unless shown to create no hazard, when opened in flight.

AMC1 23.2250 Design and construction principles

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.11 Design and Construction Principles

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3232/F3232M-20 Standard Specification for Flight Controls in Small Aircraft

F3114-21 Standard Specification for Structures

F3380-19 Standard Practice for Structural Compliance of Very Light Aeroplanes

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2250 Design and construction principles

CS-23 Amdt 4

23.601 General
23.603 Materials and workmanship
23.683 Operation tests
23.687 Spring devices
23.689 Cable systems
23.731 Wheels
23.733(a), (c) Tires

23.735(b) Brakes
23.775(b), (c), (d) Windshields and windows
23.783(b), (c)(1), (e) Doors
23.807(d)(2) Emergency Exits
23.859(b) through (i) Combustion heater fire protection
23.1323 Airspeed indicating system
23.1325(a) through (e) Static Pressure System
23.1435(a)(3), (c) Hydraulic Systems
23.1445(a), (b) Oxygen distribution system

AMC3 23.2250 Design and construction principles

CS VLA Amdt 1

VLA.601 General
VLA.603 Materials and workmanship
VLA.683 Operation tests
VLA.687 Spring devices
VLA.689 Cable systems
VLA.731 Wheels
VLA.733 Tires
VLA.735 Brakes
VLA.775 Windshields and windows
VLA.783 Exits
VLA.807 Emergency Exits
VLA.1323 Airspeed indicating system
VLA.1325 Static Pressure System
VLA.1436 Hydraulic manually-powered brake systems

CS 23.2255 Protection of structure

(a) Each part of the aeroplane, including small parts such as fasteners, must be protected against deterioration or loss of strength due to any cause likely to occur in the expected operational environment.

(b) Each part of the aeroplane must have adequate provisions for ventilation and drainage.

(c) For each part that requires maintenance, preventive maintenance, or servicing, the applicant must incorporate a means into the aeroplane design to allow such actions to be accomplished.

AMC1 23.2255 Protection of structure

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.12 Protection of Structure

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3232/F3232M-20 Standard Specification for Flight Controls in Small Aircraft

F3114-21 Standard Specification for Structures

F3380-19 Standard Practice for Structural Compliance of Very Light Aeroplanes

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2255 Protection of structure

CS-23 Amdt 4

23.607 Fasteners
23.609 Protection of Structure
23.611 Accessibility
23.689(a)(3) Cable systems

AMC3 23.2255 Protection of structure

CS VLA Amdt 1

VLA.607 Self-locking nuts
VLA.609 Protection of Structure
VLA.611 Accessibility
VLA.689 Cable systems

CS 23.2260 Materials and processes

(a) The applicant must determine the suitability and durability of materials used for parts, articles, and assemblies, the failure of which could prevent continued safe flight and landing, accounting for the effects of likely environmental conditions expected in service.

(b) The methods and processes of fabrication and assembly used must produce consistently sound structures. If a fabrication process requires close control to reach this objective, the applicant must define the process with an approved process specification as part of the design data.

(c) Except as provided for in CS 23.2260(f) and (g), the applicant must select design values that ensure material strength with probabilities that account for the criticality of the structural element. Design values must account for the probability of structural failure due to material variability.

(d) If material strength properties are required, a determination of those properties must be based on sufficient tests of material meeting specifications to establish design values on a statistical basis.

(e) If thermal effects are significant on a critical component or structure under normal operating conditions, the applicant must determine those effects.

(f) Design values, greater than the minimums specified by CS 23.2260, may be used, where only guaranteed minimum values are normally allowed, if a specimen of each individual item is tested before use to determine that the actual strength properties of that particular item will equal or exceed those used in the design.

(g) An applicant may use other material design values if specifically approved by EASA.

AMC1 23.2260 Materials and processes

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.13 Materials and Processes

F3114-21 Standard Specification for Structures

F3380-19 Standard Practice for Structural Compliance of Very Light Aeroplanes

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2260 Materials and processes

CS-23 Amdt 4

23.603 Materials and workmanship
23.605 Fabrication methods
23.613 Material strength properties and design values

AMC3 23.2260 Materials and processes

CS VLA Amdt 1

VLA.603 Materials and workmanship
VLA.605 Fabrication methods
VLA.613 Material strength properties and design values

CS 23.2265 Special factors of safety

(a) The applicant must determine a special factor of safety for each critical design value for each part, article, or assembly for which that critical design value is uncertain, and for each part, article, or assembly that is:

(1) likely to deteriorate in service before normal replacement; or

(2) subject to appreciable variability because of uncertainties in manufacturing processes or inspection methods.

(b) The applicant must determine a special factor of safety using quality controls and specifications that account for each:

(1) type of application;

(2) inspection method;

(3) structural test requirement;

(4) sampling percentage; and

(5) process and material control.

(c) The applicant must multiply the highest pertinent special factor of safety in the design for each part of the structure by each limit load and ultimate load, or ultimate load only, if there is no corresponding limit load, such as occurs with emergency condition loading.

AMC1 23.2265 Special factors of safety

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.14 Special Factors of Safety

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3114-21 Standard Specification for Structures

F3380-19 Standard Practice for Structural Compliance of Very Light Aeroplanes

[AMC&GM to CS-23: Issue 4]

AMC2 23.2265 Special factors of safety

CS-23 Amdt 4

23.619 Special factors
23.621 Casting factors
23.623 Bearing factors
23.625 Fitting factors
23.657 Hinges
23.681(b) Limit load static tests - Control System
23.693 Joints
23.785 Seats, berths, litters, safety belts, and shoulder harnesses

AMC3 23.2265 Special factors of safety

CS VLA Amdt 1

VLA.619 Special factors
VLA.621 Casting factors
VLA.623 Bearing factors
VLA.625 Fitting factors
VLA.657 Hinges
VLA.681 Limit load static tests - Control System
VLA.693 Joints
VLA.785 Seats, safety belts, and harnesses

STRUCTURAL OCCUPANT PROTECTION

CS 23.2270 Emergency conditions

(a) The aeroplane, even when damaged in an emergency landing, must protect each occupant against injury that would preclude egress when:

(1) properly using safety equipment and features provided for in the design;

(2) the occupant experiences ultimate static inertia loads likely to occur in an emergency landing; and

(3) items of mass, including engines or auxiliary power units (APUs), within or aft of the cabin, that could injure an occupant, experience ultimate static inertia loads likely to occur in an emergency landing.

(b) The emergency landing conditions specified in CS 23.2270(a) must:

(1) include dynamic conditions that are likely to occur in an emergency landing; and

(2) not generate loads experienced by the occupants, which exceed established human-injury criteria for human tolerance due to restraint or contact with objects in the aeroplane.

(c) The aeroplane must provide protection for all occupants, accounting for likely flight, ground, and emergency landing conditions.

(d) Each occupant protection system must perform its intended function and not create a hazard that could cause a secondary injury to an occupant. The occupant protection system must not prevent occupant egress or interfere with the operation of the aeroplane when not in use.

(e) Each baggage and cargo compartment must:

(1) be designed for its maximum loading and for the critical load distributions at the maximum load factors corresponding to the flight and ground load conditions determined under this CS;

(2) have a means to prevent the contents of the compartment from becoming a hazard by impacting occupants or shifting; and

(3) protect controls, wiring, lines, equipment, or accessories whose damage or failure would prevent continued safe flight and landing.

AMC1 23.2270 Emergency Conditions

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

6.15 Emergency Conditions

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3232/F3232M-20 Standard Specification for Flight Controls in Small Aircraft

F3083/F3083M-20a Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2270 Emergency Conditions

CS-23 Amdt 4

23.561 Emergency Landing Conditions - General (*With Appendix J*)
23.562 Emergency landing dynamic conditions
23.785 Seats, berths, litters, safety belts, and shoulder harnesses
23.787 Baggage and cargo compartments
23.1411(b) Safety equipment - General

AMC3 23.2270 Emergency Conditions

CS VLA Amdt 1

VLA.561 Emergency Landing Conditions - General
VLA.785 Seats, safety belts, and harnesses
VLA.787 Baggage compartments
VLA.1411 Safety equipment – General

SUBPART D — DESIGN AND CONSTRUCTION

CS 23.2300 Flight control systems

(a) The flight control systems are designed to:

(1) operate easily, smoothly, and positively enough to allow proper performance of their functions;

(2) protect against likely hazards.

(b) Trim systems, if installed, are designed to:

(1) protect against inadvertent, incorrect, or abrupt trim operation;

(2) provide information that is required for safe operation.

AMC1 23.2300 Flight control systems

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

7.1 Flight Control Systems

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3232/F3232M-20 Standard Specification for Flight Controls in Small Aircraft

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

F3117/F3117M-20 Standard Specification for Crew Interface in Aircraft

Remarks

Except as follows:

For Level 1 single-engine aeroplanes with a stall speed in the landing configuration (V_{S0}) of more than 45 knots, ASTM F3264-21, paragraph 7.1 does not include means for showing that the aeroplane is protected from loss of control when any one connecting or transmitting element in the primary flight control system fails. If applying for certification of a Level 1 single-engine aeroplane with a V_{S0} greater than 45 knots, applicants may use the requirements of CS 23.677(b)(1) at Amendment 4 as a means of complying with this aspect of CS 23.2300, or may propose a different means of compliance in accordance with CS 23.2010.

For powered trim, applicants may use the provisions of CS 23.677(d) at Amendment 4 as a means of complying with CS 23.2010.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2300 Flight control systems

CS-23 Amdt 4

23.655 Installation
23.671(a) Control systems - General
23.672(b), (c) Stability augmentation and automatic and power-operated systems
23.673 Primary flight controls
23.675 Stops
23.677(a), (b) Trim systems
23.679(c) Control system locks
23.683 Operation tests
23.685 Control system details
23.687 Spring devices
23.697 Wing flap controls
23.701 Flap interconnection
23.1329(b) Automatic Pilot System

AMC3 23.2300 Flight control systems

CS VLA Amdt 1

VLA.655 Installation
VLA.671 Control systems - General
VLA.673 Primary flight controls
VLA.675 Stops
VLA.677 Trim systems
VLA.679 Control system locks
VLA.683 Operation tests
VLA.685 Control system details
VLA.687 Spring devices
VLA.697 Wing flap controls
VLA.701 Flap interconnection

CS 23.2305 Landing gear systems

(a) The landing gear is designed to:

(1) provide stable support and control to the aeroplane during surface operation; and

(2) account for likely system failures and likely operation environment (including anticipated limitation exceedances and emergency procedures).

(b) Aeroplanes must have a reliable means of stopping the aeroplane with sufficient kinetic energy absorption to account for landing. Aeroplanes that are required to demonstrate aborted take-off capability must account for this additional kinetic energy.

(c) For aeroplanes that have a system that actuates the landing gear, there is:

(1) a positive means to keep the landing gear in the landing position; and

(2) an alternative means available to bring the landing gear in the landing position when a non-deployed system position would be a hazard.

AMC1 23.2305 Landing gear systems

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

7.2 Landing Gear Systems

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2305 Landing gear systems

CS-23 Amdt 4

23.721 General
23.729(b), (c), (g) Landing gear extension and retraction system
23.735(a), (b), (c), (e) Brakes
23.745 Nose/Tail wheel steering

AMC3 23.2305 Landing gear systems

CS VLA Amdt 1

VLA.729 Landing gear extension and retraction system
VLA.735 Brakes

CS 23.2310 Buoyancy for seaplanes and amphibians

Aeroplanes intended for operations on water must:

(a) provide buoyancy of 80 % in excess of the buoyancy required to support the maximum weight of the aeroplane in fresh water; and

(b) have sufficient margin so that the aeroplane will stay afloat at rest in calm water without capsizing in case of a likely float or hull flooding.

AMC1 23.2310 Buoyancy for seaplanes and amphibians

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

7.3 Buoyancy for Seaplanes and Amphibians

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2310 Buoyancy for seaplanes and amphibians

CS-23 Amdt 4

23.751 Main float buoyancy

23.755 Hulls
23.757 Auxiliary floats

AMC3 23.2310 Buoyancy for seaplanes and amphibians

CS VLA Amdt 1

VLA.751 Main float buoyancy
VLA.757 Auxiliary floats

OCCUPANT SYSTEM DESIGN PROTECTION

CS 23.2315 Means of egress and emergency exits

(a) With the cabin configured for take-off or landing, the aeroplane is designed to:

(1) Facilitate rapid and safe evacuation of the aeroplane in conditions likely to occur following an emergency landing, excluding ditching for Level-1, Level-2 and single-engine Level-3 aeroplanes.

(2) Have means of egress (openings, exits or emergency exits) that can be readily located and opened from the inside and outside. The means of opening must be simple and obvious.

(3) Have easy access to emergency exits when present.

(b) Aeroplanes approved for aerobatics must have a means to egress the aeroplane in flight.

AMC1 23.2315 Means of egress and emergency exits

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

7.4 Means of Egress and Emergency Exits

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3083/F3083M-20a Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

[AMC&GM to CS-23: Issue 4]

AMC2 23.2315 Means of egress and emergency exits

CS-23 Amdt 4

23.783(a), (b), (c)(2), (c)(3), (c)(4), (c)(5), (c)(6), (d), (f), (g) Doors
23.787 Baggage and cargo compartments
23.803 Emergency evacuation
23.805 Flight crew emergency exits
23.807(a), (b)(1), (b)(2), (b)(3), (b)(4), (b) (5), (b)(6) (d)(1), (d)(3), (d)(4), (c), (e) Emergency exits
23.811 Emergency exit marking
23.812 Emergency lighting
23.813 Emergency exit access
23.815 Width of aisle

AMC3 23.2315 Means of egress and emergency exits

CS VLA Amdt 1

VLA.783 Exits
VLA.787 Baggage compartments
VLA.807 Emergency exits

CS 23.2320 Occupant physical environment

(a) The applicant must design the aeroplane to:

(1) allow clear communication between the flight crew and passengers;

(2) protect the pilot against serious injury due to hazards originating from high energy, associated with systems and equipment; and

(3) protect the occupants from serious injury due to breakage of windshields, windows, and canopies.

(b) For Level-4 aeroplanes, each windshield and its supporting structure directly in front of the pilot must withstand, without penetration, the impact equivalent to a two-pound bird when the velocity of the aeroplane is equal to the aeroplane's maximum approach flap speed.

(c) The aeroplane must provide each occupant with air at a breathable pressure, free of hazardous concentrations of gases, vapours and smoke during normal operations and likely failures.

(d) If a pressurisation system is installed in the aeroplane, it must be designed to protect against:

(1) decompression to an unsafe level; and

(2) excessive differential pressure.

(e) If an oxygen system is installed in the aeroplane, it must:

(1) effectively provide oxygen to each user to prevent the effects of hypoxia; and

(2) be free from hazards in itself, in its method of operation, and its effect upon other components.

AMC1 23.2320 Occupant physical environment

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

7.5 Occupant Physical Environment

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3227/F3227M-21 Standard Specification for Environmental Systems in Aircraft

F3083/F3083M-20a Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

F3114-21 Standard Specification for Structures

F3117/F3117M-20 Standard Specification for Crew Interface in Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2320 Occupant physical environment

CS-23 Amdt 4

23.831(a), (b), (c) Ventilation
23.841(a), (b)(1), (b)(2), (b)(3), (b)(4), (b)(8), (c), (d)(1), (d)(2),(d)(3) Pressurized cabins
23.843 Pressurization tests
23.771(b), (c) Pilot compartment
23.775(a), (h)(1) Windshields and windows
23.791 Passenger information signs
23.1441 Oxygen Equipment and supply
23.1443 Minimum mass flow of supplemental oxygen
23.1445 Oxygen distribution system
23.1447 Equipment standards for oxygen dispensing units
23.1449 Means for determining use of oxygen
23.1450(a), (b) Chemical oxygen generators
23.1451 Fire protection for oxygen equipment
23.1461 Equipment containing high-energy rotors

AMC3 23.2320 Occupant physical environment

CS VLA Amdt 1

VLA.831 Ventilation
VLA.771 Pilot compartment
VLA.775 Windshields and windows

FIRE AND HIGH ENERGY PROTECTION

CS 23.2325 Fire protection

(a) The aeroplane is designed to minimise the risk of fire initiation due to:

(1) anticipated heat or energy dissipation or system failures or overheat that are expected to generate heat sufficient to ignite a fire;

(2) ignition of flammable fluids, gases or vapours; and

(3) fire-propagating or -initiating system characteristics (e.g. oxygen systems).

(b) The aeroplane is designed to minimise the risk of fire propagation by:

(1) providing adequate fire or smoke awareness and extinguishing means when practical;

(2) application of self-extinguishing, flame-resistant, or fireproof materials that are adequate to the application, location and certification level; or

(3) specifying and designing designated fire zones that meet the specifications of CS 23.2330.

AMC1 23.2325 Fire protection

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

7.6 Fire Protection

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3231/F3231M-21 Standard Specification for Electrical Systems for Aircraft with Combustion Engine Electrical Power Generation

F3234/F3234M-17 Standard Specification for Exterior Lighting in Small Aircraft

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

F3083/F3083M-20a Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

Remarks

ASTM F44 published standards for showing compliance for electrical systems that are installed on aeroplanes with electric or hybrid-electric propulsion systems. EASA has not yet accepted F3316-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2325 Fire protection

CS-23 Amdt 4

23.1453 Protection of oxygen equipment from rupture
23.851 Fire extinguishers

23.853 Passenger and crew compartment interiors (*With Appendix F*)
23.855 Cargo and baggage compartment fire protection (*With Appendix F*)
23.859(a) Combustion heater fire protection
23.863 Flammable Fluid Fire Protection
23.1337(a) Powerplant instruments installation
23.1351 Electrical system: General
23.1359(a), (c) Electrical System fire protection
23.1383(d) Taxi and landing lights (*With Appendix F*)
23.1385(d) Position light system installation

AMC3 23.2325 Fire protection

CS VLA Amdt 1

VLA.853 Passenger and crew compartment interiors (*With Appendix F*)
VLA.857 Electrical bonding
VLA.863 Flammable Fluid Fire Protection
VLA.1337 Powerplant instruments installation
VLA.1351 Electrical system: General
VLA.1384 External lights

CS 23.2330 Fire protection in designated fire zones

(a) Flight controls, engine mounts, and other flight structures within or adjacent to designated fire zones must be capable of withstanding the effects of a fire.

(b) A fire in a designated fire zone must not preclude continued safe flight and landing.

(c) Terminals, equipment, and electrical cables used during emergency procedures must be fire-resistant.

AMC1 23.2330 Fire protection in designated fire zones

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

7.7 Fire Protection in Designated Fire Zones and Adjacent Areas

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3231/F3231M-21 Standard Specification for Electrical Systems Aircraft with Combustion Engine Electrical Power Generation

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

F3114-21 Standard Specification for Structures

[AMC&GM to CS-23: Issue 4]

AMC2 23.2330 Fire protection in designated fire zones

CS-23 Amdt 4

23.865 Fire protection of flight controls, engine mounts, and other flight structure
23.1359(a), (b) Electrical System fire protection (*With Appendix F*)

23.1365(b) Electrical Cables and equipment

AMC3 23.2330 Fire protection in designated fire zones

CS VLA Amdt 1

VLA.865 Fire protection of flight controls and other flight structure
VLA.1365 Electrical Cables and equipment

CS 23.2335 Lightning protection

For operations where the exposure to lightning is likely, the aeroplane must be protected against catastrophic effects of lightning.

AMC1 23.2335 Lightning protection

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

7.8 Lightning Protection

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2335 Lightning protection

CS-23 Amdt 4

23.867 Electrical bonding and protection against lightning and static electricity
23.1365 Electrical Cables and equipment

AMC3 23.2335 Lightning protection

CS VLA Amdt 1

VLA.857 Electrical bonding
VLA.1365 Electrical Cables and equipment

CS 23.2340 Design and construction information

The following design and construction information is established:

(a) operating limitations, procedures and instructions necessary for the safe operation of the aeroplane;

(b) the need for instrument markings or placards;

(c) any additional information necessary for the safe operation of the aeroplane; and

(d) inspections or maintenance to assure continued safe operation.

AMC1 23.2340 Design and construction information

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

7.9 Design and Construction Information

F3117/F3117M-20 Standard Specification for Crew Interface in Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2340 Design and construction information

CS-23 Amdt 4

23.1523 Minimum Flight Crew
23.1524 Maximum passenger seating configuration
23.1529 Instructions for continued airworthiness (*With Appendix G*)
23.1541 Markings and placards: General

AMC3 23.2340 Design and construction information

CS VLA Amdt 1

VLA.1529 Instructions for continued airworthiness
VLA.1541 Markings and placards: General

SUBPART E — POWERPLANT INSTALLATION

CS 23.2400 Powerplant installation

(a) For the purpose of this Subpart, the aeroplane powerplant installation must include each component that is necessary for propulsion, affects propulsion safety, or provides auxiliary power to the aeroplane.

(b) Each aeroplane engine, propeller and auxiliary power unit (APU) must be type certified, or meet accepted specifications.

(c) The applicant must construct and arrange each powerplant installation to account for:

(1) all likely operating conditions, including foreign object threats;

(2) sufficient clearance of moving parts to other aeroplane parts and their surroundings;

(3) likely hazards in operation, including hazards to ground personnel; and

(4) vibration and fatigue.

(d) Hazardous accumulations of fluids, vapours or gases are isolated from the aeroplane and personnel compartments and are safely contained or discharged.

(e) Installations of powerplant components that deviate from the component limitations or installation instructions must be shown to be safe.

(f) For the purposes of this Subpart, 'energy' means any type of energy for the powerplant, including, for example, fuels of any kind or electric current.

AMC1 23.2400 Powerplant installation

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

8.1 Powerplant Installation

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

F3063/F3063M-20 Standard Specification for Aircraft Fuel Storage and Delivery

F3064/F3064M-21 Standard Specification for Aircraft Powerplant Control, Operation, and Indication

F3065/F3065M-21a Standard Specification for Aircraft Propeller System Installation

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

Remarks

ASTM F44 published standards for showing compliance for electric propulsion systems. EASA has not yet accepted F3239-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2400 Powerplant installation

CS-23 Amdt 4

23.33 Propeller speed and pitch limits
23.901 Installation
23.903(a), (b), (d) through (g) Engines and auxiliary power units
23.905(a), (b), (d) through (h) Propellers
23.907 Propeller vibration
23.909(a), (c), (d), (e) Turbocharger systems
23.925 Propeller clearance
23.934 Turbojet and turbofan engine thrust reverser systems tests
23.943 Negative acceleration
23.951 Fuel System - General
23.955 Fuel Flow
23.957(b) Flow between interconnected tanks
23.963(b), (c) Fuel tanks: general
23.967(a), (b) Fuel tank installation
23.975 Fuel tank vents and carburettor vapour vents
23.979 Pressure fuelling systems
23.997(a), (c), (d) Fuel strainer or filter
23.999 Fuel system drains
23.1001(a) through (f) Fuel jettisoning system
23.1011 Oil system General
23.1013 Oil tanks
23.1015 Oil tank tests
23.1017 Oil lines and fittings
23.1019 Oil strainer or filter
23.1021 Oil system drains
23.1023 Oil radiators
23.1027 Propeller feathering system
23.1041 Cooling – General
23.1043 Cooling tests
23.1045 Cooling test procedures for turbine engine powered airplanes
23.1047 Cooling test procedures for reciprocating engine powered airplanes
23.1061 Installation
23.1063 Coolant tank tests
23.1097 Carburettor de-icing fluid system capacity
23.1099 Carburettor de-icing fluid system detail design
23.1101 Induction air preheater design
23.1103 Induction system ducts
23.1105 Induction system screens
23.1107 Induction system filters
23.1109 Turbocharger bleed air system
23.1111 Turbine engine bleed air system
23.1121 Exhaust System - General
23.1125 Exhaust heat exchangers
23.1141(b), (c), (d) Powerplant controls: general
23.1163 Powerplant accessories
23.1165 Engine ignition systems
23.1193 Cowling and nacelle
23.1197 Fire extinguishing agents

23.1199 Extinguishing agent containers
23.1201 Fire extinguishing system materials
23.1203(b), (c) Fire detector system

AMC3 23.2400 Powerplant installation

CS VLA Amdt 1

VLA.33 Propeller speed and pitch limits
VLA.901 Installation
VLA.903 Engine
VLA.905 Propeller
VLA.907 Propeller vibration
VLA.909 Supercharger
VLA.925 Propeller clearance
VLA.943 Negative acceleration
VLA.951 Fuel System - General
VLA.955 Fuel Flow
VLA.957 Flow between interconnected tanks
VLA.963 Fuel tanks: general
VLA.967 Fuel tank installation
VLA.975 Fuel tank vents and carburettor vapour vents
VLA.999 Fuel system drains
VLA.1011 Oil system General
VLA.1013 Oil tanks
VLA.1015 Oil tank tests
VLA.1017 Oil lines and fittings
VLA.1019 Oil strainer or filter
VLA.1021 Oil system drains
VLA.1023 Oil radiators
VLA.1041 Cooling – General
VLA.1047 Cooling test procedures for reciprocating engine powered airplanes
VLA.1061 Installation
VLA.1063 Coolant tank tests
VLA.1101 Carburettor air preheater design
VLA.1103 Induction system ducts
VLA.1105 Induction system screens
VLA.1121 Exhaust System - General
VLA.1125 Exhaust heat exchangers
VLA.1141 Powerplant controls: general
VLA.1163 Powerplant accessories
VLA.1165 Engine ignition systems
VLA.1193 Cowling and nacelle

CS 23.2405 Power or thrust control systems

Power or thrust control systems are systems that intervene with the power selection commanded by the direct power settings.

(a) Power or thrust control systems must be designed so no unsafe condition will result during normal operation of the system.

(b) Any single failure or likely combination of failures of a power or thrust control system must not prevent continued safe flight and landing of the aeroplane.

(c) Inadvertent operation of a power or thrust control system by the flight crew must be prevented, or if not prevented, must not result in an unsafe condition.

(d) Unless the failure of an automatic power or thrust control system is 'extremely remote', the system must:

(1) provide a means for the flight crew to verify that the system is in an operating condition;

(2) provide a means for the flight crew to override the automatic function if the hazard outweighs the safety benefits; and

(3) prevent inadvertent deactivation of the system.

AMC1 23.2405 Power or thrust control systems

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

8.2 Power or Thrust Control Systems & 8.5 Reversing Systems

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

F3064/F3064M-21 Standard Specification for Aircraft Powerplant Control, Operation, and Indication

F3065/F3065M-21a Standard Specification for Aircraft Propeller System Installation

F3117/F3117M-20 Standard Specification for Crew Interface in Aircraft

ASTM F44 published standards for showing compliance for electric propulsion systems. EASA has not yet accepted F3239-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2405 Power or thrust control systems

CS-23 Amdt 4

23.904 Automatic power reserve system (*With Appendix H*)

23.933 Reversing systems

AMC3 23.2405 Power or thrust control systems

None

CS 23.2410 Powerplant installation hazard assessment

The applicant must assess each installation separately and in relation to other aeroplane systems and installations to show that any hazard resulting from the likely failure of any system component or accessory will not:

(a) prevent continued safe flight and landing or, if continued safe flight and landing cannot be ensured, the hazards have been minimised;

(b) cause serious injury that may be avoided; and

(c) require immediate action by crew members for continued operation of any remaining powerplant system.

AMC1 23.2410 Powerplant installation hazard assessment

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

8.3 Powerplant Installation Hazard Assessment

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

F3063/F3063M-20 Standard Specification for Aircraft Fuel Storage and Delivery

F3064/F3064M-21 Standard Specification for Aircraft Powerplant Control, Operation, and Indication

F3065/F3065M-21a Standard Specification for Aircraft Propeller System Installation

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

F3117-20 Standard Specification for Crew Interface in Aircraft

ASTM F44 published standards for showing compliance for electric propulsion systems. EASA has not yet accepted F3239-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2410 Powerplant installation hazard assessment

CS-23 Amdt 4

23.903(b) through (g) Engines and auxiliary power units
23.909(b), (c) Turbocharger systems
23.937 Powerplant operating characteristics
23.953 Fuel system independence
23.955 Fuel flow
23.959 Unusable fuel supply
23.991 Fuel pumps
23.1001(h) Fuel jettisoning system
23.1011 General
23.1027 Propeller feathering system
23.1109 Turbocharger bleed air system
23.1141(e) Powerplant controls: general
23.1143(g) Engine controls
23.1147 Mixture controls
23.1163 Powerplant accessories
23.1437 Accessories for twin-engine aeroplanes

AMC3 23.2410 Powerplant installation hazard assessment

CS VLA Amdt 1

VLA.903 Engine
VLA.909 Supercharger
VLA.955 Fuel flow
VLA.959 Unusable fuel supply
VLA.991 Fuel pumps
VLA.1011 General
VLA.1141 Powerplant controls: general
VLA.1143 Engine controls
VLA.1147 Mixture controls
VLA.1163 Powerplant accessories

CS 23.2415 Powerplant installation ice protection

(a) The aeroplane design must prevent foreseeable accumulation or shedding of ice or snow that adversely affect powerplant operation.

(b) The powerplant installation design must prevent any accumulation of ice or snow that adversely affects powerplant operation in those icing conditions for which certification is requested.

AMC1 23.2415 Powerplant installation ice protection

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

8.4 Powerplant Installation Ice Protection

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

F3063/F3063M-20 Standard Specification for Aircraft Fuel Storage and Delivery

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

ASTM F44 published standards for showing compliance for electric propulsion systems. EASA has not yet accepted F3239-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2415 Powerplant installation ice protection

CS-23 Amdt 4

23.929 Engine installation ice protection
23.1093 Induction system icing protection
23.975 Fuel tank vents and carburettor vapour vents
23.997 Fuel strainer or filter
23.1105 Induction system screens

Remarks

Following the cancellation of FAA AC-1419-2D, applicants should now use the icing conditions that are outlined in AMC1 23.2165.

[AMC&GM to CS-23: Issue 4]

AMC3 23.2415 Powerplant installation ice protection

CS VLA Amdt 1

VLA.1093 Induction system icing protection
VLA.975 Fuel tank vents and carburettor vapour vents
VLA.1105 Induction system screens

CS 23.2420

(reserved)

CS 23.2425 Powerplant operational characteristics

(a) The installed powerplant must operate without any hazardous characteristics during normal and emergency operation within the range of operation limitations for the aeroplane and powerplant installation.

(b) The design must allow the shutdown and restart of the powerplant in flight within an established operating envelope.

AMC1 23.2425 Powerplant operational characteristics

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

8.6 Powerplant Operational Characteristics

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

F3064/F3064M-21 Standard Specification for Aircraft Powerplant Control, Operation, and Indication

F3065/F3065M-21a Standard Specification for Aircraft Propeller System Installation

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

F3117-20 Standard Specification for Crew Interface in Aircraft

ASTM F44 published standards for showing compliance for electric propulsion systems. EASA has not yet accepted F3239-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2425 Powerplant operational characteristics

CS-23 Amdt 4

23.903(b), (d) through (g) Engines
23.905(c) Propellers
23.909(a) Turbocharger systems
23.934 Turbojet and turbofan engine thrust reverser systems tests
23.939 Turbopropeller-drag limiting systems
23.943 Negative acceleration
23.1142 Auxiliary power unit controls
23.1145 Ignition switches
23.1165 Engine ignition systems

AMC3 23.2425 Powerplant operational characteristics

CS VLA Amdt 1

VLA.903 Engine
VLA.905 Propeller
VLA.909 Supercharger
VLA.943 Negative acceleration
VLA.1145 Ignition switches
VLA.1165 Engine ignition systems

CS 23.2430 Powerplant installation, energy storage and distribution systems

(a) Each system must:

(1) Be designed to provide independence between multiple energy storage and supply systems so that a failure of any one component in one system will not result in the loss of energy storage or supply of another system.

(2) Be designed to prevent catastrophic events due to lightning strikes taking into account direct and indirect effects for aeroplanes where the exposure to lightning is likely.

(3) Provide energy to the powerplant installation with adequate margins to ensure safe functioning under all permitted and likely operating conditions, and accounting for likely component failures.

(4) Provide the information established in CS 23.2445(g) to the flight crew and provide uninterrupted supply of that energy when the system is correctly operated, accounting for likely energy fluctuations.

(5) Provide a means to safely remove or isolate the energy stored within the system.

(6) Be designed to retain the energy under all likely operating conditions and minimise hazards to the occupants during any survivable emergency landing. For Level-4 aeroplanes, failure due to overload of the landing system must be taken into account.

(7) Prevent hazardous contamination of the energy supplied to each powerplant installation.

(b) Each storage system must:

(1) withstand the loads under likely operating conditions without failure, accounting for installation;

(2) be isolated from personnel compartments and protected from likely hazards;

(3) be designed to prevent significant loss of stored energy due to energy transfer or venting under likely operating conditions;

(4) provide energy for at least one-half hour of operation at maximum continuous power or thrust; and

(5) be capable of jettisoning energy safely if this functionality is provided.

(c) Each energy-storage-refilling or -recharging system must be designed to:

(1) prevent improper refilling or recharging;

(2) prevent contamination of the stored energy during likely operating conditions; and

(3) prevent the occurrence of any hazard to the aeroplane or to persons during refilling or recharging.

(d) Likely errors during ground handling of the aeroplane must not lead to a hazardous loss of stored energy.

[CS-23: Amdt 6]

AMC1 23.2430 Powerplant installation, energy storage and distribution systems

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

8.7 Fuel and Energy Storage and Distribution Systems

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

F3063/F3063M-20 Standard Specification for Aircraft Fuel Storage and Delivery

F3064/F3064M-21 Standard Specification for Aircraft Powerplant Control, Operation, and Indication

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

F3114-21 Standard Specification for Structures

ASTM F44 published standards for showing compliance for electric propulsion systems. EASA has not yet accepted F3239-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2430 Powerplant installation, energy storage and distribution systems

CS-23 Amdt 4

23.951 Fuel System - General
23.953 Fuel system independence

23.954 Fuel system lightning protection
23.955 Fuel flow
23.957 Flow between interconnected tanks
23.959 Unusable fuel supply
23.961 Fuel system hot weather operation
23.963(a), (d), (e) Fuel tank: general
23.965 Fuel tank tests
23.967(a), (c), (d), (e) Fuel tank installation
23.969 Fuel tank expansion space
23.971 Fuel tank sump
23.973 Fuel tank filler connection
23.975 Fuel tank vents and carburettor vapour vents
23.977 Fuel tank outlet
23.979 Pressure fuelling systems
23.991 Fuel pumps
23.993 Fuel system lines and fittings
23.994 Fuel system components
23.997(b), (d), (e) Fuel strainer or filter
23.999 Fuel system drains
23.1001(a) through (f) Fuel jettisoning system
23.1337(a) Powerplant instruments installation
23.721 Landing gear systems - General

Remarks

Provisions of AMC2 cover only fuel systems

AMC3 23.2430 Powerplant installation, energy storage and distribution systems

CS VLA Amdt 1

VLA.951 Fuel System - General
VLA.955 Fuel flow
VLA.957 Flow between interconnected tanks
VLA.959 Unusable fuel supply
VLA.961 Fuel system hot weather operation
VLA.963 Fuel tank: general
VLA.965 Fuel tank tests
VLA.967 Fuel tank installation
VLA.969 Fuel tank expansion space
VLA.971 Fuel tank sump
VLA.973 Fuel tank filler connection
VLA.975 Fuel tank vents and carburettor vapour vents
VLA.977 Fuel strainer or filter
VLA.991 Fuel pumps
VLA.993 Fuel system lines and fittings
VLA.999 Fuel system drains
VLA.1337 Powerplant instruments

Remarks

Provisions of AMC3 cover only fuel systems

CS 23.2435 Powerplant installation support systems

(a) Powerplant installation support systems are all systems whose direct purpose is to support the powerplant or the energy storage device in its intended function as part of the powerplant installation.

(b) Powerplant installation support systems that have a direct effect on the engine availability are considered in the engine reliability.

(c) Powerplant installation support systems are designed for the operating conditions applicable to the location of installation.

(d) Systems must be capable of operating under the conditions likely to occur.

(e) System function and characteristics that have an effect on the powerplant installation system performance are established.

(f) Ingestion of likely foreign objects that would be hazardous to the engine is prevented.

(g) The pilot must be aware of the air intake configuration and able to influence it.

(h) Any likely single failures of powerplant installation support systems that result in a critical loss of thrust are mitigated.

AMC1 23.2435 Powerplant installation support systems

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

8.8 Powerplant Induction, Exhaust, and Support Systems

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

ASTM F44 published standards for showing compliance for electric propulsion systems. EASA has not yet accepted F3239-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2435 Powerplant installation support systems

CS-23 Amdt 4

23.1091 Air induction system
23.1101(a) Induction air preheater design
23.1103(a) through (d) Induction system ducts
23.1111(b) Turbine engine bleed air system
23.1121 Exhaust System - General
23.1123 Exhaust system
23.1125 Exhaust heat exchangers

Remarks

Provisions of AMC2 cover only induction and exhaust systems

AMC3 23.2435 Powerplant installation support systems

CS VLA Amdt 1

VLA.1091 Air induction
VLA.1101 Carburettor air preheater design
VLA.1103 Induction system ducts
VLA.1121 Exhaust System - General
VLA.1123 Exhaust manifold
VLA.1125 Exhaust heat exchangers

Remarks

Provisions of AMC3 cover only induction and exhaust systems

CS 23.2440 Powerplant installation fire protection

There must be means to isolate and mitigate hazards to the aeroplane in the event of a powerplant system fire or overheat in operation.

AMC1 23.2440 Powerplant installation fire protection

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

8.9 Powerplant Installation Fire Protection

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

F3063/F3063M-20 Standard Specification for Aircraft Fuel Storage and Delivery

F3064/F3064M-21 Standard Specification for Aircraft Powerplant Control, Operation, and Indication

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

ASTM F44 published standards for showing compliance for electric propulsion systems. EASA has not yet accepted F3239-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2440 Powerplant installation fire protection

CS-23 Amdt 4

23.995 Fuel valves and controls
23.1103(e), (f) Induction system ducts
23.1141(f) Powerplant controls: general
23.1181 Designated fire zones: regions included
23.1182 Nacelle areas behind firewalls
23.1183 Lines, fittings, and components

23.1189 Shutoff means
23.1191 Firewalls
23.1192 Engine accessory compartment diaphragm
23.1193 Cowling and nacelle
23.1195 Fire extinguishing systems
23.1197 Fire extinguishing agents
23.1201 Fire extinguishing system materials
23.1203(a), (e) Fire detector system
23.1435(c) Hydraulic Systems

AMC3 23.2440 Powerplant installation fire protection

CS VLA Amdt 1

VLA.995 Fuel valves and controls
VLA.1103 Induction system ducts
VLA.1141 Powerplant controls and accessories: general
VLA.1182 Nacelle areas behind firewalls
VLA.1183 Lines, fittings, and components
VLA.1191 Firewalls
VLA.1193 Cowling and nacelle

CS 23.2445 Powerplant installation information

The following powerplant installation information is established:

(a) operating limitations, procedures and instructions necessary for the safe operation of the aeroplane;

(b) the need for instrument markings or placards;

(c) any additional information necessary for the safe operation of the aeroplane;

(d) inspections or maintenance to assure continued safe operation;

(e) information related to the air intake configuration;

(f) techniques and associated limitations for engine starting and stopping; and

(g) energy level information to support energy management, including consideration of a likely component failure within the system.

AMC1 23.2445 Powerplant installation information

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

8.10 Powerplant Installation Information

F3117/F3117M-20 Standard Specification for Crew Interface in Aircraft

F3174/F3174M-19 Standard Specification for Establishing Operating Limitations and Information for Aeroplanes

[AMC&GM to CS-23: Issue 4]

AMC2 23.2445 Powerplant installation information

CS-23 Amdt 4

23.1521 Powerplant limitations
23.1522 Auxiliary power unit limitations
23.1529 Instructions for continued airworthiness (*With Appendix G*)

AMC3 23.2445 Powerplant installation information

CS VLA Amdt 1

VLA.1521 Powerplant limitations
VLA.1529 Instructions for continued airworthiness

SUBPART F — SYSTEMS AND EQUIPMENT

CS 23.2500 General requirements on systems and equipment function

(a) Requirements CS 23.2500, CS 23.2505 and CS 23.2510 are general requirements applicable to systems and equipment installed in the aeroplane, and should not be used to supersede any other specific CS-23 requirement.

(b) Equipment and systems required to comply with type certification requirements, airspace requirements or operating rules, or whose improper functioning would lead to a hazard, must be designed and installed so that they perform their intended function throughout the operating and environmental limits for which the aeroplane is certified.

AMC1 23.2500 General requirements on systems and equipment function

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

9.1 Systems and Equipment Function Requirements

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3231/F3231M-21 Standard Specification for Electrical Systems for Aircraft with Combustion Engine Electrical Power Generation

F3235-17a Standard Specification for Aircraft Storage Batteries

F3232/F3232M-20 Standard Specification for Flight Controls in Small Aircraft

F3233/F3233M-21 Standard Specification for Flight and Navigation Instrumentation in Aircraft

F3229/F3229M-17 Standard Practice for Static Pressure System Tests in Small Aircraft

F3064/F3064M-21 Standard Specification for Aircraft Powerplant Control, Operation, and Indication

F3066/F3066M-18 Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

F3117-20 Standard Specification for Crew Interface in Aircraft

F3120/F3120M-20 Standard Specification for Ice Protection for General Aviation Aircraft

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

Remarks

ASTM F44 published standards for showing compliance for electrical systems that are installed on aeroplanes with electric or hybrid-electric propulsion systems. EASA has not yet accepted F3316-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

EASA does not consider that F3235-17a alone provides a complete means of compliance for electrical storage batteries in small aircraft (e.g. paragraph 4.2.1). Therefore, additional and complementary means of compliance should be developed and agreed with EASA for the specific application.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2500 General requirements on systems and equipment function

CS-23 Amdt 4

23.1301 Function and installation
23.1303 Flight and navigation instruments
23.1305 Powerplant instruments
23.1309(a) Equipment, systems, and installations
23.1311 Electronic display instrument systems
23.1321 Arrangement and visibility
23.1323 Airspeed indicating system
23.1325 Static pressure system
23.1327 Magnetic direction indicator
23.1329 Automatic pilot system
23.1335 Flight director systems
23.1351(b), (e), (f), (g) Electrical Systems - General
23.1357 Circuit protective devices
23.1361 Master switch arrangement
23.1367 Switches
23.1381(c) Instrument lights
23.1416 Pneumatic de-icer boot system
23.729(d) Landing gear extension and retraction system
23.843(b) Pressurization tests
23.1141(b), (c), (d) Powerplant controls: general
23.1201 Fire extinguishing system materials
23.1203(e) Fire detector system

Remarks

23.1305 must be complemented. F3064-18 § 6.2.1.6 provides this AMC.

AMC3 23.2500 General requirements on systems and equipment function

CS VLA Amdt 1

VLA.1301 Function and installation
VLA.1303 Flight and navigation instruments
VLA.1305 Powerplant instruments
VLA.1307 Miscellaneous equipment
VLA.1309 Equipment, systems, and installations
VLA.1321 Arrangement and visibility
VLA.1323 Airspeed indicating system
VLA.1325 Static pressure system
VLA.1327 Magnetic direction indicator
VLA.1351 Electrical Systems - General

VLA.1357 Circuit protective devices
VLA.1361 Master switch arrangement
VLA.1367 Switches
VLA.729 Landing gear extension and retraction system
VLA.1141 Powerplant controls and accessories: general

Remarks

VLA.1305 must be complemented. F3064-18 § 6.2.1.6 provides this AMC.

GM 23.2500(b) General requirements on systems and equipment function

The improper functioning of equipment and systems may be caused by intentional unauthorised electronic interaction (IUEI). An applicant that wishes to certify an aeroplane with certification level 4 should, therefore, also consider cybersecurity threats as possible sources of 'improper functioning' of the equipment and systems. In showing compliance with CS 23.2500(b) for equipment and systems whose improper functioning could lead to an unacceptable threat condition, the applicant may consider AMC 20-42. This AMC provides acceptable means, guidance and methods to perform security risk assessment and mitigation for aircraft information systems.

[AMC&GM Issue No: 23/3]

CS 23.2505 General requirements on equipment installation

(a) Each item of installed equipment is installed according to limitations specified for that equipment.

(b) On multi-engine aeroplanes, engine-driven accessories essential to safe operation must be distributed among multiple engines.

AMC1 23.2505 General requirements on equipment installation

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

*9.2 Equipment Function and Installation Requirements*F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3231/F3231M-21 Standard Specification for Electrical Systems for Aircraft with Combustion Engine Electrical Power Generation

F3235-17a Standard Specification for Aircraft Storage Batteries

F3232/F3232M-20 Standard Specification for Flight Controls in Small Aircraft

F3233/F3233M-21 Standard Specification for Flight and Navigation Instrumentation in Aircraft

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

Remarks

ASTM F44 published standards for showing compliance for electrical systems that are installed on aeroplanes with electric or hybrid-electric propulsion systems. EASA has not yet accepted F3316-19;

however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

EASA does not consider that F3235-17a alone provides a complete means of compliance for electrical storage batteries in small aircraft (e.g. paragraph 4.2.1). Therefore, additional and complementary means of compliance should be developed and agreed with EASA for the specific application.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2505 General requirements on equipment installation

CS-23 Amdt 4

23.1301 Function and installation
23.1437 Accessories for twin-engine aeroplanes

AMC3 23.2505 General requirements on equipment installation

CS VLA Amdt 1

VLA.1301 Function and installation

CS 23.2510 Equipment, systems, and installations

(a) The equipment and systems identified in CS 23.2500, considered separately and in relation to other systems, must be designed and installed such that:

(1) each catastrophic failure condition is extremely improbable; and

(2) each hazardous failure condition is extremely remote; and

(3) each major failure condition is remote.

(b) The operation of equipment and systems not covered by CS 23.2500 does not cause a hazard to the aeroplane or its occupants throughout the operating and environmental limits for which the aeroplane is certified.

AMC1 23.2510 Equipment, systems, and installations

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

9.3 Equipment, Systems, and Installation

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3230-20a Standard Practice for Safety Assessment of Systems and Equipment in Small Aircraft

F3233/F3233M-21 Standard Specification for Flight and Navigation Instrumentation in Aircraft

F3227/F3227M-21 Standard Specification for Environmental Systems in Aircraft

F3309/F3309M-21 Standard Practice for Simplified Safety Assessment of Systems and Equipment in Small Aircraft

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

Remarks

At variance with F3230-20a, paragraph 4.2.4.1, the use of service history data is limited to the fleet of an aeroplane type/aeroplane types for which the applicant is the holder of one or more type certificates (TCs), the owner of the data, or, if accepted by EASA, has concluded with the owner of the data an agreement that permits its use by the applicant for that purpose.

At variance with the note under Table 1 of F3309/F3309M-21, that Table 1 provides the applicable criteria for classification of a failure condition based on the severity of the effects.

At variance with F3309/F3309M-21, paragraph 3.2.4, the term 'on the order of' means that, for various reasons, the component failure rate data is not precise enough to allow accurate estimates of the probabilities of failure conditions. This inability to establish accurate estimates of the probabilities of failure conditions results in some degree of uncertainty and the expression 'on the order of' is included in the descriptions of the quantitative probability terms that are provided to reflect this uncertainty. When calculating the estimated probability of each failure condition, that uncertainty should be accounted for in a way that does not compromise safety. In this context, 'on the order of' does not mean that for instance, the quantitative assessment of a major failure condition can be exceeded by a certain percentage to be 'on the order of' 1E-5. It means that there is uncertainty when determining the component failure rate, and that uncertainty should be accounted for in a way that does not compromise safety.

At variance with Example 2 in paragraph 4.5.3.3 of F3309/F3309M-21, the use of service history data is limited to the fleet of an aeroplane type/aeroplane types for which the applicant is the holder of the TC(s), the owner of the data, or, if accepted by EASA, has concluded with the owner of the data an agreement that permits its use by the applicant for that purpose.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2510 Equipment, systems, and installations

CS-23 Amdt 4

23.1309 Equipment, systems, and installations
23.1323 Airspeed indicating system
23.1325 Static pressure system
23.1329 Automatic pilot system
23.1331(b), (c) Instruments using a power source
23.1335 Flight director systems
23.1337(b), (c) Powerplant instruments installation
23.1357 Circuit protective devices
23.1431 Electronic equipment
23.1437 Accessories for twin-engine aeroplanes
23.672(c) Stability augmentation and automatic and power-operated systems
23.677(d) Trim systems
23.701 Flap interconnection
23.735(d) Brakes
23.775(g) Windshields and windows
23.831(d) Ventilation
23.841(b)(8), (c), (d)(2), (d)(3) Pressurised cabins

AMC3 23.2510 Equipment, systems, and installations

CS VLA Amdt 1

VLA.1309 Equipment, systems, and installations
VLA.1323 Airspeed indicating system
VLA.1325 Static pressure system
VLA.1331 Instruments using a power supply
VLA.1337 Powerplant instruments
VLA.1357 Circuit protective devices
VLA.1431 Electronic equipment
VLA.677 Trim systems
VLA.701 Flap interconnection
VLA.735 Brakes
VLA.775 Windshields and windows
VLA.831 Ventilation

CS 23.2515 Electrical and electronic system lightning protection

For an aeroplane where the exposure to lightning is likely:

(a) each electrical or electronic system that performs a function, the failure of which would prevent the continued safe flight and landing of the aeroplane, must be designed and installed such that:

(1) the function at the aeroplane level is not adversely affected during and after the time the aeroplane is exposed to lightning; and

(2) the system recovers normal operation of that function in a timely manner after the aeroplane is exposed to lightning unless the system's recovery conflicts with other operational or functional requirements of the system;

(b) each electrical and electronic system that performs a function, the failure of which would reduce the capability of the aeroplane or the ability of the flight crew to respond to an adverse operating condition, must be designed and installed such that the system recovers normal operation of that function in a timely manner after the aeroplane is exposed to lightning.

[CS-23: Amdt 6]

AMC1 23.2515 Electrical and electronic system lightning protection

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

9.4 Electrical and Electronic System Lightning Protection

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

Remarks:

F3367-21a Standard Practice for Simplified Methods for Addressing High-Intensity Radiated Fields (HIRF) and Indirect Effects of Lightning on Aircraft, as referenced in F3061/F3061M-20, paragraph 17.3.4, is not an EASA accepted practice.

At variance with F3061-20:

(a) paragraph 17.3.1 should be replaced with the following:

each electrical or electronic system that performs a function, the failure of which would prevent the continued safe flight and landing of the aeroplane, must be designed and installed such that:

(1) the function at the aeroplane level is not adversely affected during and after the time the aeroplane is exposed to lightning; and

(2) the system recovers normal operation of that function in a timely manner after the aeroplane is exposed to lightning unless the system's recovery conflicts with other operational or functional requirements of the system;

(b) paragraph 17.3.2 should be replaced with the following:

each electrical and electronic system that performs a function, the failure of which would reduce the capability of the aeroplane or the ability of the flight crew to respond to an adverse operating condition, must be designed and installed such that the system recovers normal operation of that function in a timely manner after the aeroplane is exposed to lightning; and

(c) paragraphs 17.3.3 and 17.3.4 should be removed.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2515 Electrical and electronic system lightning protection

CS-23 Amdt 4

23.1306 Electrical and electronic system lightning protection

AMC3 23.2515 Electrical and electronic system lightning protection

None

CS 23.2520 High-intensity radiated fields (HIRF) protection

(a) Each electrical and electronic system that perform a function, the failure of which would prevent the continued safe flight and landing of the aeroplane, must be designed and installed such that:

(1) the function at the aeroplane level is not adversely affected during and after the time the aeroplane is exposed to the HIRF environment; and

(2) the system recovers normal operation of that function in a timely manner after the aeroplane is exposed to the HIRF environment, unless the system's recovery conflicts with other operational or functional requirements of the system.

(b) For aeroplanes approved for instrument flight rules (IFR) operations, each electrical and electronic system that performs a function, the failure of which would reduce the capability of the aeroplane or the ability of the flight crew to respond to an adverse operating condition,

must be designed and installed such that the system recovers normal operation of that function in a timely manner after the aeroplane is exposed to the HIRF environment.

AMC1 23.2520 High-intensity radiated fields (HIRF) protection

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

9.5 High-Intensity Radiated Fields (HIRF) Protection

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3236-17 Standard Specification for High Intensity Radiated Field (HIRF) Protection in Small Aircraft

Remarks:

F3367-21 Standard Practice for Simplified Methods for Addressing High-Intensity Radiated Fields (HIRF) and Indirect Effects of Lightning on Aircraft, as referenced in F3061/F3061M-20, paragraph 18.1, is not an EASA accepted practice.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2520 High-intensity radiated fields (HIRF) protection

CS-23 Amdt 4

23.1308 High-Intensity Radiated Fields (HIRF) protection

AMC3 23.2520 High-intensity radiated fields (HIRF) protection

None

CS 23.2525 System power generation, storage, and distribution

The power generation, storage, and distribution for any system must be designed and installed to:

(a) supply the power required for operation of connected loads during all intended operating conditions;

(b) ensure no single failure or malfunction will prevent the system from supplying the essential loads required for continued safe flight and landing; and

(c) have enough capacity, if the primary source fails, to supply essential loads, including non-continuous essential loads for the time needed to complete the function, required for safe flight and landing.

AMC1 23.2525 System power generation, storage, and distribution

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

9.6 System Power Generation, Storage, and Distribution

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3231/F3231M-21 Standard Specification for Electrical Systems for Aircraft with Combustion Engine Electrical Power Generation

F2490-20 Standard Guide for Aircraft Electrical Load and Power Source Capacity Analysis

F3233/F3233M-21 Standard Specification for Flight and Navigation Instrumentation in Aircraft

F3117-20 Standard Specification for Crew Interface in Aircraft

F3120/F3120M-20 Standard Specification for Ice Protection for General Aviation Aircraft

Remarks

At variance with F3231-21:

(a) paragraph 4.4.2 should be replaced with the following:

4.4.2 A protective device for a circuit essential to flight safety shall not be a fuse and it may not be used to protect any other circuit.

(b) paragraph 4.4.5 should be replaced with the following:

4.4.5 If the ability to reset a circuit protective device is essential to safety in flight, a means shall be provided so that it can be readily reset in flight; refer to Specification F3117/F3117M.

ASTM F44 published standards for showing compliance for electrical systems that are installed on aeroplanes with electric or hybrid-electric propulsion systems. EASA has not yet accepted F3316-19; however, EASA would take into consideration applications from applicants that use this standard as the basis for the development of their means of compliance subject to agreement with EASA.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2525 System power generation, storage, and distribution

CS-23 Amdt 4

23.1303 Flight and navigation instruments
23.1331(b), (c) Instruments using a power source
23.1351(a), (b), (c) Electrical Systems — General
23.1353 Storage battery design and installation
23.1357 Circuit protective devices

Remarks

At variance with CS 23.1357(b) and (d), EASA does not accept a protective device for a circuit essential to flight safety in designs applications after the date of entry into force of the AMC & GM to CS-23 Issue 4; automatic fuses or circuit breakers should be used instead.

[AMC&GM to CS-23: Issue 4]

AMC3 23.2525 System power generation, storage, and distribution

CS-VLA Amdt 1

VLA.1303 Flight and navigation instruments
VLA.1331 Instruments using a power supply
VLA.1351 Electrical Systems — General
VLA.1353 Storage battery design and installation

VLA.1357 Circuit protective devices

Remarks

At variance with CS-VLA 1357(b) and (d), EASA does not accept a protective device for a circuit essential to flight safety in designs applications after the date of entry into force of the AMC & GM to CS-23 Issue 4; automatic fuses or circuit breakers should be used instead.

[AMC&GM to CS-23: Issue 4]

CS 23.2530 External and cockpit lighting

(a) The applicant must design and install all lights to minimise any adverse effects on the performance of flight crew duties.

(b) Any position and anti-collision lights, if required by operational rules, must have the intensities, flash rate, colours, fields of coverage, and other characteristics to provide sufficient time for another aircraft to avoid a collision.

(c) Any position lights, if required by operational rules, must include a red light on the left side of the aeroplane, a green light on the right side of the aeroplane, spaced laterally as far apart as practicable, and a white light facing aft, located on an aft portion of the aeroplane or on the wing tips.

(d) Taxi and landing lights, if required, must be designed and installed so they provide sufficient light for night operations.

(e) For seaplanes or amphibian aeroplanes, riding lights must provide a white light visible in clear atmospheric conditions.

AMC1 23.2530 External and cockpit lighting

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

9.7 External and Cockpit Lighting

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3233/F3233M-21 Standard Specification for Flight and Navigation Instrumentation in Aircraft

F3234/F3234M-17 Standard Specification for Exterior Lighting in Small Aircraft

F3117-20 Standard Specification for Crew Interface in Aircraft

F3120/F3120M-20 Standard Specification for Ice Protection for General Aviation Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2530 External and cockpit lighting

CS-23 Amdt 4

23.1381 Instrument lights
23.1383(a), (b), (c) Taxi and landing lights

23.1385(a), (b), (c) Position light system installation
23.1387 Position light system dihedral angles
23.1391 Minimum intensities in the horizontal plane of position lights
23.1393 Minimum intensities in any vertical plane of position lights
23.1395 Maximum intensities in overlapping beams of position lights
23.1397 Colour specifications
23.1399 Riding light
23.1401 Anti-collision light system

AMC3 23.2530 External and cockpit lighting

CS VLA Amdt 1

VLA.1384 External lights

CS 23.2535 Safety equipment

Safety and survival equipment, required by the operating rules, must be reliable, readily accessible, easily identifiable, and clearly marked to identify its method of operation.

AMC1 23.2535 Safety equipment

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

9.8 Safety Equipment

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3083/F3083M-20a Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

F3117/F3117M-20 Standard Specification for Crew Interface in Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2535 Safety equipment

CS-23 Amdt 4

23.1411 Safety Equipment-General
23.1415 Ditching equipment

AMC3 23.2535 Safety equipment

CS VLA Amdt 1

VLA.1411 Safety Equipment-General

CS 23.2540 Flight in icing conditions

An applicant who requests certification for flight in icing conditions must show the following in the icing conditions for which certification is requested:

(a) the ice protection system provides for safe operation; and

(b) the aeroplane design must provide protection from stalling when the autopilot is operating.

AMC1 23.2540 Flight in icing conditions

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

9.9 Flight in Icing Conditions

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3233/F3233M-21 Standard Specification for Flight and Navigation Instrumentation in Aircraft

F3120/F3120M-20 Standard Specification for Ice Protection for General Aviation Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2540 Flight in icing conditions

CS-23 Amdt 4

23.1323 Airspeed indicating system
23.1325(b), (g) Static pressure system
23.775(f) Windshields and windows

Remarks

Following the cancellation of FAA AC-1419-2D, applicants should now use the icing conditions that are outlined in AMC1 23.2165.

[AMC&GM to CS-23: Issue 4]

AMC3 23.2540 Flight in icing conditions

None

CS 23.2545 Pressurised systems elements

Pressurised systems must withstand appropriate proof and burst pressures.

AMC1 23.2545 Pressurised systems elements

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

9.10 Pressurized System Elements

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3229/F3229M-17 Standard Practice for Static Pressure System Tests in Small Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2545 Pressurised systems elements

CS-23 Amdt 4

23.1438 Pressurization and pneumatic systems
23.1435(a)(4), (b) Hydraulic Systems
23.1453 Protection of oxygen equipment from rupture

AMC3 23.2545 Pressurised systems elements

None

CS 23.2550

(reserved)

CS 23.2555 Installation of recorders (e.g. cockpit voice recorders and flight data recorders)

If recording is required by the operating rules, the system:

(a) is installed so as to ensure accurate and intelligible recording and safeguarding of the required data, also in conditions encountered during crash, water immersion or fire;

(b) is powered by the most reliable power source and remains powered for as long as possible without jeopardising service to essential or emergency loads and emergency operation of the aeroplane;

(c) includes features to facilitate the localisation of a memory medium after an accident; and

(d) is installed so that it automatically records when the aeroplane is capable of moving under its own power.

AMC1 23.2555 Installation of recorders (e.g. cockpit voice recorders and flight data recorders)

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

9.12 Installation of Cockpit recorders & 9.13 Installation of Flight Data Recorders

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3228-17 Standard Specification for Flight Data and Voice Recording in Small Aircraft

9.13 Installation of Flight Data Recorders:

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3228-17 Standard Specification for Flight Data and Voice Recording in Small Aircraft

[AMC&GM to CS-23: Issue 4]

AMC2 23.2555 Installation of recorders (e.g. cockpit voice recorders and flight data recorders)

CS-23 Amdt 4

23.1457 Cockpit voice recorders
23.1459 Flight recorders

AMC3 23.2555 Installation of recorders (e.g. cockpit voice recorders and flight data recorders)

None

SUBPART G — FLIGHT CREW INTERFACE AND OTHER INFORMATION

CS 23.2600 Flight crew compartment

(a) The pilot compartment arrangement, including pilot view, and its equipment must allow the flight crew to perform their duties within the operating envelope of the aeroplane, without excessive concentration, skill, alertness, or fatigue.

(b) The applicant must install flight, navigation, surveillance, and powerplant installation controls and displays so that a qualified flight crew can monitor and perform defined tasks associated with the intended functions of systems and equipment. The system and equipment design must minimise flight crew errors, which could result in additional hazards.

(c) For Level-4 aeroplanes, the flight crew interface design must allow for continued safe flight and landing after the loss of vision through any one of the windshield panels.

AMC1 23.2600 Flight crew compartment

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

10.1 Flight Crew Compartment Interface

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3232/F3232M-20 Standard Specification for Flight Controls in Small Aircraft

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

F3063/F3063M-20 Standard Specification for Aircraft Fuel Storage and Delivery

F3064/F3064M-21 Standard Specification for Aircraft Powerplant Control, Operation, and Indication

F3114-21 Standard Specification for Structures

F3117-20 Standard Specification for Crew Interface in Aircraft

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

Remarks

ASTM F3264-21 does not contain standards that ensure that the required pilot compartment view is provided in conditions of fog or frost formation on the internal portion of the windshield and side windows. Pilot compartment view with formation of fog or frost must be addressed in showing compliance with CS 23.2600(a). Applicants may use the provisions of CS 23.773(b) at Amendment 4 as a means of complying with this aspect of CS 23.2600(a), or may propose a different means of compliance in accordance with CS 23.2010.

F3117/F3117M-20 does not contain Section 4.3 on Level 4 aeroplanes, which is included in the next revision (F3117/F3117M-21a).

[AMC&GM to CS-23: Issue 4]

AMC2 23.2600 Flight crew compartment

CS-23 Amdt 4

23.671 Control systems - General
23.677(a) Trim systems
23.699 Wing flap position indicator
23.729(e) Landing gear extension and retraction system
23.745 Nose/Tail wheel steering
23.771(a) Pilot compartment
23.773 Pilot compartment view
23.775(e), (h)(2) Windshields and windows
23.777 Cockpit controls
23.779 Motion and effect of cockpit controls
23.781 Cockpit control knob shape
23.831(c) Ventilation
23.1141(g) Powerplant controls: general
23.1142 Auxiliary power unit controls
23.1143(a) through (f) Engine controls
23.1145 Ignition switches
23.1147 Mixture controls
23.1149 Propeller speed and pitch controls
23.1153 Propeller feathering controls
23.1155 Turbine engine reverse thrust and propeller pitch settings below the flight regime
23.1157 Carburettor air temperature controls
23.1203(d) Fire detector system
23.1329(d) Automatic pilot system
23.1335 Flight director systems
23.1367 Switches
23.1381(a), (b) Instrument lights
23.1419(d) Ice protection
23.1435(a)(2) Hydraulic Systems
23.1523 Minimum Flight Crew

AMC3 23.2600 Flight crew compartment

CS VLA Amdt 1

VLA.671 Control systems - General
VLA.677 Trim systems
VLA.699 Wing flap position indicator
VLA.729 Landing gear extension and retraction system
VLA.745 Nose/Tail wheel steering
VLA.771 Pilot compartment
VLA.773 Pilot compartment view
VLA.775 Windshields and windows
VLA.777 Cockpit controls
VLA.779 Motion and effect of cockpit controls
VLA.781 Cockpit control knob shape
VLA.831 Ventilation
VLA.1141 Powerplant controls: general

VLA.1143 Engine controls
VLA.1145 Ignition switches
VLA.1147 Mixture controls
VLA.1367 Switches

CS 23.2605 Installation and operation information

(a) Each item of installed equipment related to the flight crew interface must be labelled, if applicable, as for its identification, function, or operating limitations, or any combination of these factors.

(b) There must be a discernible means of providing system operating parameters required to operate the aeroplane, including warnings, cautions, and normal indications, to the responsible crew member.

(c) Information concerning an unsafe system operating condition must be provided in a timely manner to the crew member responsible for taking corrective action. The information must be clear enough to avoid likely crew member errors.

(d) Information related to safety equipment is easily identifiable and its method of operation is clearly marked.

AMC1 23.2605 Installation and operation information

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

10.2 Installation and Operation Information

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3232/F3232M-20 Standard Specification for Flight Controls in Small Aircraft

F3233/F3233M-21 Standard Specification for Flight and Navigation Instrumentation in Aircraft

F3231/F3231M-21 Standard Specification for Electrical Systems for Aircraft with Combustion Engine Electrical Power Generation

F3227/F3227M-21 Standard Specification for Environmental Systems in Aircraft

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

F3063/F3063M-20 Standard Specification for Aircraft Fuel Storage and Delivery

F3064/F3064M-21 Standard Specification for Aircraft Powerplant Control, Operation, and Indication

F3117-20 Standard Specification for Crew Interface in Aircraft

F3120/F3120M-20 Standard Specification for Ice Protection for General Aviation Aircraft

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

Remarks

F3064-15 § 6.2.1 must be complemented. F3064-18a § 6.2.1.6 and subsequent revisions provide this AMC.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2605 Installation and operation information

CS-23 Amdt 4

23.671(b) Control systems - General
23.672(a) Stability augmentation and automatic and power-operated systems
23.679(a), (b) Control system locks
23.703 Take-off warning system
23.729(f) Landing gear extension and retraction system
23.783(e)(3) Doors
23.841(b)(5), (b)(6), (d)(4), (d)(5) Pressurised cabins
23.991(c) Fuel pumps
23.1142 Auxiliary power unit controls
23.1301(b) Function and installation
23.1305 Powerplant instruments
23.1309(d) Equipment, systems, and installations
23.1322 Warning, caution and advisory lights
23.1326 Pitot heat indication systems
23.1329(h) Automatic pilot system
23.1331(a) Instruments using a power source
23.1335 Flight director systems
23.1337(b), (d) Powerplant instruments installation
23.1351(c), (d) Electrical Systems - General
23.1416(c) Pneumatic de-icer boot system
23.1441(c) Oxygen Equipment and supply
23.1561 Safety equipment

Remarks

23.1305 must be complemented. F3064-18 § 6.2.1.6 provides this AMC.

AMC3 23.2605 Installation and operation information

CS VLA Amdt 1

VLA.671 Control systems - General
VLA.679 Control system locks
VLA.729 Landing gear extension and retraction system
VLA.783 Doors
VLA.991 Fuel pumps
VLA.1301 Function and installation
VLA.1305 Powerplant instruments
VLA.1309 Equipment, systems, and installations
VLA.1322 Warning, caution and advisory lights
VLA.1331 Instruments using a power supply
VLA.1337 Powerplant instruments
VLA.1351 Electrical Systems - General
VLA.1561 Safety equipment

Remarks

VLA.1305 must be complemented. F3064-18 § 6.2.1.6 provides this AMC.

CS 23.2610 Instrument markings, control markings and placards

(a) Each aeroplane must display in a conspicuous manner any placard and instrument marking necessary for operation.

(b) The design must clearly indicate the function of each cockpit control, other than primary flight controls.

(c) The applicant must include instrument marking and placard information in the Aeroplane Flight Manual.

AMC1 23.2610 Instrument markings, control markings and placards

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

10.3 Instrument Markings, Control Markings, and Placards

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3063/F3063M-20 Standard Specification for Aircraft Fuel Storage and Delivery

F3117-20 Standard Specification for Crew Interface in Aircraft

F3120/F3120M-20 Standard Specification for Ice Protection for General Aviation Aircraft

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2610 Instrument markings, control markings and placards

CS-23 Amdt 4

23.733 Tires
23.777 Cockpit controls
23.841(b)(7) Pressurised cabins
23.1001(g) Fuel jettisoning system
23.1321 Arrangement and visibility
23.1337(d) Powerplant instruments installation
23.1450(c) Chemical oxygen generators
23.1501 General
23.1505 Airspeed limitations
23.1507 Operating manoeuvring speed
23.1511 Flap extended speed
23.1513 Minimum control speed
23.1519 Weight and center of gravity
23.1521 Powerplant limitations
23.1522 Auxiliary power unit limitations
23.1523 Minimum flight crew
23.1524 Maximum passenger seating configuration
23.1525 Kinds of operation
23.1527 Maximum operating altitude
23.1541 Marking and Placards - General
23.1543 Instrument marking: general

23.1545 Airspeed indicator
23.1547 Magnetic direction indicator
23.1549 Powerplant and auxiliary power unit instruments
23.1551 Oil quantity indicator
23.1553 Fuel quantity indicator
23.1555 Control markings
23.1557 Miscellaneous marking and placards
23.1559 Operating limitations placard
23.1561 Safety equipment
23.1563 Airspeed placards
23.1567 Flight manoeuvre placard

AMC3 23.2610 Instrument markings, control markings and placards

CS VLA Amdt 1

VLA.777 Cockpit controls
VLA.1321 Arrangement and visibility
VLA.1337 Powerplant instruments
VLA.1501 General
VLA.1505 Airspeed limitations
VLA.1507 Manoeuvring speed
VLA.1511 Flap extended speed
VLA.1519 Weight and center of gravity
VLA.1521 Powerplant limitations
VLA.1525 Kinds of operation
VLA.1541 Marking and Placards - General
VLA.1543 Instrument marking: general
VLA.1545 Airspeed indicator
VLA.1547 Magnetic direction indicator
VLA.1549 Powerplant instruments
VLA.1551 Oil quantity indicator
VLA.1555 Control markings
VLA.1557 Miscellaneous marking and placards
VLA.1559 Operating limitations placard
VLA.1561 Safety equipment

CS 23.2615 Flight, navigation, and powerplant instruments

(a) Installed systems must provide the flight crew member who sets or monitors parameters for the flight, navigation, and powerplant the information necessary to do so during each phase of flight. This information must:

(1) be presented in a manner that the crew members can monitor the parameters and trends, as needed to operate the aeroplane; and

(2) include limitations, unless the limitation cannot be exceeded in all intended operations.

(b) Indication systems that integrate the display of flight or powerplant parameters required to safely operate the aeroplane, or required by the operating rules, must:

(1) not inhibit the primary display of flight or powerplant parameters needed by any flight crew member in any normal mode of operation; and

(2) in combination with other systems, be designed and installed so information essential for continued safe flight and landing will be available to the flight crew in a timely manner after any single failure or probable combination of failures.

AMC1 23.2615 Flight, navigation, and powerplant instruments

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

10.4 Flight, Navigation, and Powerplant Instruments

F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft

F3062/F3062M-20 Standard Specification for Aircraft Powerplant Installation

F3064/F3064M-21 Standard Specification for Aircraft Powerplant Control, Operation, and Indication

F3432-20a Standard Practice for Powerplant Instruments

F3117/F3117M-20 Standard Specification for Crew Interface in Aircraft

Remarks

F3064-15 § 6.2.1 must be complemented. F3064-18 § 6.2.1.6 and subsequent revisions provide this AMC.

[AMC&GM to CS-23: Issue 4]

AMC2 23.2615 Flight, navigation, and powerplant instruments

CS-23 Amdt 4

23.1141(g) Powerplant controls: general
23.1142 Auxiliary power unit controls
23.1303 Flight and navigation instruments
23.1305 Powerplant instruments
23.1311 Electronic display instrument systems
23.1323 Airspeed indicating system
23.1325 Static pressure system
23.1327 Magnetic direction indicator
23.1337 Powerplant instruments installation

Remarks

23.1305 must be complemented. F3064-18 § 6.2.1.6 and subsequent revisions provide this AMC.

[AMC&GM to CS-23: Issue 4]

AMC3 23.2615 Flight, navigation, and powerplant instruments

CS VLA Amdt 1

VLA.1141 Powerplant controls: general
VLA.1303 Flight and navigation instruments
VLA.1305 Powerplant instruments

VLA.1323 Airspeed indicating system
VLA.1325 Static pressure system
VLA.1327 Magnetic direction indicator
VLA.1337 Powerplant instruments

Remarks

VLA.1305 must be complemented. F3064-18 § 6.2.1.6 and subsequent revisions provide this AMC.

CS 23.2620 Aeroplane Flight Manual

The applicant must provide an aeroplane flight manual that must be delivered with each aeroplane and contains the following information:

(a) operating limitations and procedures;

(b) performance information;

(c) loading information;

(d) instrument marking and placard information; and

(e) any other information necessary for the safe operation of the aeroplane.

AMC1 23.2620 Aeroplane Flight Manual

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

10.5 Aeroplane Flight Manual

F3117/F3117M-20 Standard Specification for Crew Interface in Aircraft

F3174/F3174M-19 Standard Specification for Establishing Operating Limitations and Information for Aeroplanes

F3120/F3120M-20 Standard Specification for Ice Protection for General Aviation Aircraft

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2620 Aeroplane Flight Manual

CS-23 Amdt 4

23.1581 Airplane Flight Manual and Approved Manual Material - General
23.1583 Operating limitations
23.1585 Operating procedures
23.1587 Performance information
23.1589 Loading information

AMC3 23.2620 Aeroplane Flight Manual

CS VLA Amdt 1

VLA.1581 Airplane Flight Manual and Approved Manual Material - General
VLA.1583 Operating limitations
VLA.1585 Operating procedures
VLA.1587 Performance information
VLA.1589 Loading information

CS 23.2625 Instructions for Continued Airworthiness

(a) The applicant must prepare Instructions for Continued Airworthiness that are appropriate for the certification level and performance level of the aeroplane.

(b) If Instructions for Continued Airworthiness are not supplied by the manufacturer of an appliance or product installed in the aeroplane, the Instructions for Continued Airworthiness for the aeroplane must include the information essential to the continued airworthiness of the aeroplane.

(c) The Instructions for Continued Airworthiness must contain a Section titled 'Airworthiness limitations' that is segregated and clearly distinguishable from the rest of the document. This Section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure required for type certification. This Section must contain a legible statement in a prominent location that reads: 'The Airworthiness limitations Section is approved and variations must also be approved'.

(d) The applicant must develop and implement procedures to prevent structural failures due to foreseeable causes of strength degradation, which could result in serious or fatal injuries, loss of the aeroplane, or extended periods of operation with reduced safety margins. The Instructions for Continued Airworthiness must include procedures developed under CS 23.2255.

AMC1 23.2625 Instructions for Continued Airworthiness

ASTM F44 F3264-21 Standard Specification for Normal Category Aeroplanes Certification

10.6 Instructions for Continued Airworthiness

F3120/F3120M-20 Standard Specification for Ice Protection for General Aviation Aircraft

F3117/F3117M-20 Standard Specification for Crew Interface in Aircraft

F3408/F3408M-21 Standard Specification for Aircraft Emergency Parachute Recovery Systems

[AMC&GM to CS-23: Issue 4]

AMC2 23.2625 Instructions for Continued Airworthiness

CS-23 Amdt 4

23.1529 Instructions for Continued Airworthiness (*With Appendix G*)

AMC3 23.2625 Instructions for Continued Airworthiness

CS VLA Amdt 1

VLA.1529 Instructions for Continued Airworthiness