

**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 5 / AMC & GM to CS-23 Issue 3

24 June 2020<sup>1</sup>

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<sup>1</sup> For the date of entry into force of this Amendment, kindly refer to Decision 2020/006/R in the [Official Publication](#) of the Agency.

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## PREAMBLE CS-23

ED Decision 2017/013/R

### Amendment 5

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

<b>Subpart A</b>	
CS 23.1 through CS 23.3	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
CS 23.2000 through CS 23.2010	Created ( <a href="#">NPA 2016-05</a> )
<b>Subpart B</b>	
CS 23.21 through CS 23.253	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
CS 23.2100 through CS 23.2170	Created ( <a href="#">NPA 2016-05</a> )
<b>Subpart C</b>	
CS 23.301 through CS 23.575	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
CS 23.2200 through CS 23.2270	Created ( <a href="#">NPA 2016-05</a> )
AMC — Subpart C	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
<b>Subpart D</b>	
CS 23.601 through CS 23.871	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
CS 23.2300 through CS 23.2340	Created ( <a href="#">NPA 2016-05</a> )
AMC — Subpart D	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
<b>Subpart E</b>	
CS 23.901 through CS 23.1203	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
CS 23.2400 through CS 23.2445	Created ( <a href="#">NPA 2016-05</a> )
AMC — Subpart E	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
<b>Subpart F</b>	
CS 23.1301 through CS 23.1461	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
CS 23.2500 through CS 23.2555	Created ( <a href="#">NPA 2016-05</a> )
AMC — Subpart F	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
<b>Subpart G</b>	
CS 23.1501 through CS 23.1589	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
CS 23.2600 through CS 23.2625	Created ( <a href="#">NPA 2016-05</a> )
AMC — Subpart G	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
<b>Appendices</b>	
Appendix A through K	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
AMC — Appendix A	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )
<b>Flight Test Guide (FTG)</b>	Deleted and moved to AMC ( <a href="#">NPA 2016-05</a> )

ED Decision 2015/018/R

### Amendment 4

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

<b>Subpart F</b>	
CS 23.1306	Created ( <a href="#">NPA 2014-16</a> )
CS 23.1308	Created ( <a href="#">NPA 2014-16</a> )
Appendix K	Created ( <a href="#">NPA 2014-16</a> )
CS 23.1309	Amended ( <a href="#">NPA 2014-16</a> )

ED Decision 2012/012/R

**Amendment 3**

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

<b>Subpart D</b>	
CS 23.851	Amended ( <a href="#">NPA 2011-14</a> )
AMC 23.851(c)	Amended ( <a href="#">NPA 2011-14</a> )
<b>Subpart E</b>	
CS 23.1197	Amended ( <a href="#">NPA 2011-14</a> )
AMC 23.1197	Created ( <a href="#">NPA 2011-14</a> )

ED Decision 2010/008/R

**Amendment 2**

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

<b>Subpart B</b>	
CS 23.221	Amended (Editorial correction)
<b>Subpart C</b>	
Appendix D	Amended (Editorial correction)
AMC 23.573(a)(1)&(3)	Amended ( <a href="#">NPA 2009-06</a> )
<b>Subpart D</b>	
CS 23.603	Amended ( <a href="#">NPA 2009-06</a> )
AMC 23.603	Deleted ( <a href="#">NPA 2009-06</a> )
AMC 23.613	Amended ( <a href="#">NPA 2009-06</a> )
AMC 23.629	Amended ( <a href="#">NPA 2009-06</a> & Editorial correction)
CS 23.813(b)(4)	Amended (Editorial correction)
<b>Subpart E</b>	
CS 23.909	Amended (Editorial correction)
<b>Flight Test Guide (FTG)</b>	
192 Paragraph 23.909	Amended (Editorial correction)
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:

Preamble	Preamble added
<b>Subpart B</b>	
CS 23.49(c)	Amended ( <a href="#">NPA 2008-08</a> )
CS 23.49(d)	Created ( <a href="#">NPA 2008-08</a> )
<b>Subpart C</b>	
CS 23.562(d)	Created ( <a href="#">NPA 2008-08</a> )
CS 23.562(e)	Amended ( <a href="#">NPA 2008-08</a> )

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## PREAMBLE AMC & GM TO CS-23

ED Decision 2020/006/R

### Issue 3

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

GM 23.2500(b)	Created
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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 issues of the AMC & GM to CS 23 Amendment 5, 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 the remarks column of the specific line for 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]

### **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 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 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.

For example, the ASTM standard accepted by this AMC does not contain provisions that address powered trim system runaways. Therefore, in order to maintain the level of safety that was in CS-23

Amendment 4, applicants proposing the use of F3264-18b as a means of complying with [CS 23.2300](#) for an aeroplane with a powered trim system would need to supplement the standards of F3264-18b with additional means of compliance to demonstrate safe controllability after a probable trim system runaway. To do this, applicants could use CS 23.677(d) from Amendment 4, or other means accepted under [CS 23.2010](#) of Amendment 5.

Similarly, applicants may propose designs with novel or unusual features for which neither F3264-18b 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. Therefore, applicants proposing the use of the AMC to CS-23 as a means of complying with CS-23 Amendment 5 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 table<sup>1</sup> provided in Sections B through G identifies which consensus standard contains an accepted demonstration of compliance with the requirement. 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 in the header of the table<sup>2</sup>. The AMC1 is therefore basically a copy of ASTM F3264, except when it is considered necessary to include or exclude specific standards. This is identified in the remarks column of the table<sup>2</sup>.

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 stated in the remarks column<sup>2</sup> 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. A table<sup>2</sup> is provided in Sections B through G that identifies 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<sup>3</sup>) 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

<sup>1</sup> eRules CS-23 AMC editorial note: In contrary to what is explained in the AMC1 to CS 23.2010 above, the eRules representation is not presenting the AMC in a table format. The remarks from the AMC tables are provided directly following their relevant AMC.

<sup>2</sup> eRules CS-23 AMC editorial note: In contrary to what is explained in the AMC1 to CS 23.2010 above, the eRules representation is not presenting the AMC in a table format. The remarks from the AMC tables are provided directly following their relevant AMC.

<sup>3</sup> 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>

applicant and EASA when using an existing certification basis. A table<sup>2</sup> is provided in Sections B through G that identifies which CS-VLA Amendment 1 requirements 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 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](http://www.astm.org))

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## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

5.1 *Weight/Mass and Centre of Gravity:*

[F3082/F3082M-17](#) Standard Specification for Weights and Centers of Gravity of Aircraft

[F3114-15](#) Standard Specification for Structures

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 5.2 Performance Data:

[F3179/F3179M-18](#) Standard Specification for Performance of Aircraft

#### Remarks

F3179 revised from -16 to -18

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

##### 5.3 Stall Speed:

[F3179/F3179M-18](#) Standard Specification for Performance of Aircraft

#### Remarks

F3179 revised from -16 to -18

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 5.4 Take-off Performance:

[F3179/F3179M-18](#) Standard Specification for Performance of Aircraft

#### Remarks

F3179 revised from -16 to -18

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 5.5 Climb Requirements:

[F3179/F3179M-18](#) Standard Specification for Performance of Aircraft

#### Remarks

F3179 revised from -16 to -18

## 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

VLA.65 Climb: All engines operating

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 5.6 Climb Information:

[F3179/F3179M-18](#) Standard Specification for Performance of Aircraft

**Remarks**

F3179 revised from -16 to -18

**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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification**

5.7 *Landing:*

[F3179/F3179M-18](#) Standard Specification for Performance of Aircraft

**Remarks**

F3179 revised from -16 to -18

**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 complete a landing without causing substantial damage or serious injury using the steepest approved approach gradient procedures and providing a reasonable safe margin below  $V_{REF}$  or above 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.

## AMC1 23.2135 Controllability

### ASTM F44 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

5.8 *Controllability:*

[F3173/F3173M-17](#) Standard Specification for Aircraft Handling Characteristics

#### Remarks

F3173 revised from -15 to -17

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

5.9 Trim:

[F3173/F3173M-17](#) Standard Specification for Aircraft Handling Characteristics

#### Remarks

F3173 revised from -15 to -17

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

5.10 Stability:

[F3173/F3173M-17](#) Standard Specification for Aircraft Handling Characteristics

#### Remarks

F3173 revised from -15 to -17

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

5.11 *Stall Characteristics, Stall Warning, and Spins:*

[F3180/F3180M-18](#) Standard Specification for Low-Speed Flight Characteristics of Aircraft

#### Remarks

F3180 revised from -16 to -18

## 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 AMC2. Applicants may use the provision in ASTM F3180-18 to show compliance with [CS 23.2150](#)

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

5.12 *Ground and Water Handling Characteristics:*

[F3173/F3173M-17](#) Standard Specification for Aircraft Handling Characteristics

#### Remarks

F3173 revised from -15 to -17

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

5.13 *Vibration, Buffeting, and High-Speed Characteristics:*

[F3173/F3173M-17](#) Standard Specification for Aircraft Handling Characteristics

#### Remarks

F3173 revised from -15 to -17

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

5.14 Performance and Flight Characteristics Requirements for Flight in Icing Conditions:

[F3120/F3120M-15](#) Standard Specification for Ice Protection for General Aviation Aircraft

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

### CS-23 Amdt 4

23.1419 Ice Protection

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

##### 5.15 Operating Limitations:

[F3174/F3174M-18](#) Standard Specification for Establishing Operating Limitations and Information for Aeroplanes

#### Remarks

F3174 revised from -15 to -18

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

##### 6.1 Structural Design Envelope:

[F.3116/F3116M-18](#) Standard Specification for Design Loads and Conditions

#### Remarks

F3116 revised from -15 to -18

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

TBD

#### Remarks

Consensus standard in development

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

6.3 *Structural Design Loads:*

[F3116/F3116M-18](#) Standard Specification for Design Loads and Conditions

#### Remarks

F3116 revised from -15 to -18

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

6.4 *Flight Load Conditions:*

[F3116/F3116M-18](#) Standard Specification for Design Loads and Conditions

#### Remarks

F3116 revised from -15 to -18

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

6.5 *Ground and Water Load Conditions:*

[F3116/F3116M-18](#) Standard Specification for Design Loads and Conditions

[F3331-18](#) Standard Practice for Aircraft Water Loads

### Remarks

F3116 revised from -15 to -18

F3331 New

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

6.6 *Component Loading Conditions:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3232/F3232M-17](#) Standard Specification for Flight Controls in Small Aircraft

[F3116/F3116M-18](#) Standard Specification for Design Loads and Conditions

#### Remarks

F3116 revised from -15 to -18

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 6.7 Limit and Ultimate Loads:

[F3114-15](#) Standard Specification for Structures

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification**

6.8 *Structural Strength:*

[F3114-15](#) Standard Specification for Structures

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

6.9 *Structural Durability:*

[F3115/F3115M-15](#) Standard Specification for Structural Durability for Small Aeroplanes

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

6.10 *Aeroelasticity:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3093/F3093M-15](#) Standard Specification for Aeroelasticity Requirements

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

6.11 Design and Construction Principles:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3232/F3232M-17](#) Standard Specification for Flight Controls in Small Aircraft

[F3114-15](#) Standard Specification for Structures

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

6.12 *Protection of Structure:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3232/F3232M-17](#) Standard Specification for Flight Controls in Small Aircraft

[F3114-15](#) Standard Specification for Structures

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

### Remarks

F3066 revised from -15 to -18

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

6.13 *Materials and Processes:*

[F3114-15](#) Standard Specification for Structures

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 6.14 Special Factors of Safety:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3114-15](#) Standard Specification for Structures

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

##### 6.15 Emergency Conditions:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3232/F3232M-17](#) Standard Specification for Flight Controls in Small Aircraft

[F3083/F3083M-16](#) Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

##### 7.1 Flight Control Systems:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3232/F3232M-17](#) Standard Specification for Flight Controls in Small Aircraft

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

#### Remarks

Except as follows:

For Level 1 single-engine airplanes with a stall speed in the landing configuration ( $V_{S0}$ ) of more than 45 knots, ASTM F3264-18b, paragraph 7.1 does not include means for showing that the airplane 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 airplane 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](#).

F3066 revised from -15 to -18

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 7.2 Landing Gear Systems:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

7.3 *Buoyancy for Seaplanes and Amphibians:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

##### 7.4 Means of Egress and Emergency Exits:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3083/F3083M-16](#) Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 7.5 Occupant Physical Environment:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3227/F3227M-17](#) Standard Specification for Environmental Systems in Small Aircraft

[F3083/F3083M-16](#) Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

[F3114-15](#) Standard Specification for Structures

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

#### **Remarks**

F3117 revised from -15 to -18b

## **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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

##### 7.6 Fire Protection:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3231/F3231M-17](#) Standard Specification for Electrical Systems in Small Aircraft

[F3234/F3234M-17](#) Standard Specification for Exterior Lighting in Small Aircraft

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

[F3083/F3083M-16](#) Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

#### Remarks

F3066 revised from -15 to -18

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

7.7 *Fire Protection in Designated Fire Zones and Adjacent Areas:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3231/F3231M-17](#) Standard Specification for Electrical Systems in Small Aircraft

[F3114-15](#) Standard Specification for Structures

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

[F3083/F3083M-16](#) Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

### Remarks

F3066 revised from -15 to -18

Different from ASTM F3264-18b paragraph 7.7, ASTM F3083-16 has been added as means of complying with [CS 23.2325](#).

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

7.8 *Lightning Protection:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification**

None

**Remarks**

No AMC expected

**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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

##### 8.1 Powerplant Installation:

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

[F3063/F3063M-18a](#) Standard Specification for Aircraft Fuel and Energy Storage and Delivery

[F3064/F3064M-18a](#) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

[F3065/F3065M-18](#) Standard Specification for Aircraft Propeller System Installation

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

#### **Remarks**

F3062 revised from -16 to -18

F3063 revised from -16a to -18a

F3064 revised from -15 to -18a

F3065 revised from -15 to -18

F3066 revised from -15 to -18

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

8.2 Power or Thrust Control Systems & 8.5 Reversing Systems:

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

[F3064/F3064M-18a](#) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

[F3065/F3065M-18](#) Standard Specification for Aircraft Propeller System Installation

#### **Remarks**

F3062 revised from -16 to -18

F3064 revised from -15 to -18a

F3065 revised from -15 to -18

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 8.3 Powerplant Installation Hazard Assessment:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

[F3063/F3063M-18a](#) Standard Specification for Aircraft Fuel and Energy Storage and Delivery

[F3064/F3064M-18a](#) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

[F3065/F3065M-18](#) Standard Specification for Aircraft Propeller System Installation

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

#### Remarks

F3062 revised from -16 to -18

F3063 revised from -16a to -18a

F3064 revised from -15 to -18a

F3065 revised from -15 to -18

F3066-15 revised from -15 to -18

F3117 revised from -15 to -18b

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

8.4 *Powerplant Installation Ice Protection:*

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

[F3063/F3063M-18a](#) Standard Specification for Aircraft Fuel and Energy Storage and Delivery

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

### Remarks

Different from ASTM F3264-18b paragraph 8.4, ASTM F3063-18a has been added as a means of complying with [CS 23.2415](#).

F3062 revised from -16 to -18

F3063 revised from -16a to -18a

F3066 revised from -15 to -18

## 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

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

8.6 *Powerplant Operational Characteristics:*

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

[F3064/F3064M-18a](#) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

[F3065/F3065M-18](#) Standard Specification for Aircraft Propeller System Installation

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

### Remarks

F3062 revised from -16 to -18

F3064 revised from -15 to -18a



F3065 revised from -15 to -18

F3066 revised from -15 to -18

F3117 revised from -15 to -18b

## 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\(a\)\(7\)](#) 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.

## AMC1 23.2430 Powerplant installation, energy storage and distribution systems

### ASTM F44 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 8.7 Fuel and Energy Storage and Distribution Systems:

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

[F3063/F3063M-18a](#) Standard Specification for Aircraft Fuel and Energy Storage and Delivery

[F3064/F3064M-18a](#) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

[F3114-15](#) Standard Specification for Structures

#### Remarks

Different from ASTM F3264-18b paragraph 8.7, ASTM F3061-17 has been considered not relevant as a means of complying with [CS 23.2430](#) and therefore not included.

F3062 revised from -16 to -18

F3063 revised from -16a to -18a

F3064 revised from -15 to -18a

F3066 revised from -15 to -18

F3114-15 New

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification**

8.8 *Powerplant Induction, Exhaust, and Support Systems:*

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

**Remarks**

Different from ASTM F3264-18b paragraph 8.8, ASTM F3066-18 has been considered not relevant as a means of complying with [CS 23.2435](#) and therefore not included.

F3062 revised from -16 to -18

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 8.9 Powerplant Installation Fire Protection:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

[F3063/F3063M-18](#) Standard Specification for Aircraft Fuel and Energy Storage and Delivery

[F3064/F3064M-18a](#) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

**Remarks**

With reference to ASTM F3264-18b paragraph 8.9, ASTM F3063-18 has been added as a means of complying with [CS 23.2440](#).

F3062 revised from -16 to -18

F3063 revised from -16a to -18

F3064 revised from -15 to -18a

F3066 revised from -15 to -18

**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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

None

#### Remarks

No AMC expected

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

9.1 *Systems and Equipment Function and Safety Requirements:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3230-17](#) Standard Practice for Safety Assessment of Systems and Equipment in Small Aircraft

[F3231/F3231M-17](#) Standard Specification for Electrical Systems in Small Aircraft

[F3235-17a](#) Standard Specification for Electrical Storage Batteries in Small Aircraft

[F3232/F3232M-17](#) Standard Specification for Flight Controls in Small Aircraft

[F3233/F3233M-17](#) Standard Specification for Instrumentation in Small Aircraft

[F3229/F3229M-17](#) Standard Practice for Static Pressure System Tests in Small Aircraft

[F3309/F3309M-18](#) Standard practice for Simplified Safety Assessment of Systems and Equipment in Small Aircraft

[F3064/F3064M-18a](#) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

[F3066/F3066M-18](#) Standard Specification for Aircraft Powerplant Installation Hazard Mitigation

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

[F3120-15](#) Standard Specification for Ice Protection for General Aviation Aircraft

#### Remarks

F3309 New

F3064 revised from -15\* to -18a

\* F3064-15 § 6.2.1 must be complemented. F3064-18 § 6.2.1.6 provides this AMC.

F3066 revised from -15 to -18

F3117 revised from -15 to -18b



F3120-15 added as AMC

## 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.

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**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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification**

9.2 *Equipment Function and Installation Requirements:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3230-17](#) Standard Practice for Safety Assessment of Systems and Equipment in Small Aircraft

[F3231/F3231M-17](#) Standard Specification for Electrical Systems in Small Aircraft

[F3235-17a](#) Standard Specification for Electrical Storage Batteries in Small Aircraft

[F3232/F3232M-17](#) Standard Specification for Flight Controls in Small Aircraft

[F3233/F3233M-17](#) Standard Specification for Instrumentation in Small Aircraft

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

**Remarks**

Different from ASTM F3264-18b paragraph 9.2, ASTM F3230-17 is included as a means of complying with [CS 23.2505](#)

F3117 revised from -15 to -18b

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

9.3 *Equipment, Systems, and Installation:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3230-17](#) Standard Practice for Safety Assessment of Systems and Equipment in Small Aircraft

[F3231/F3231M-17](#) Standard Specification for Electrical Systems in Small Aircraft

[F3235-17a](#) Standard Specification for Electrical Storage Batteries in Small Aircraft

[F3232/F3232M-17](#) Standard Specification for Flight Controls in Small Aircraft

[F3233/F3233M-17](#) Standard Specification for Instrumentation in Small Aircraft

[F3229/F3229M-17](#) Standard Practice for Static Pressure System Tests in Small Aircraft

[F3227/F3227M-17](#) Standard Specification for Environmental Systems in Small Aircraft

### Remarks

Different from ASTM F3264-18b paragraph 9.3, ASTM F3231-17 and F3229-17 are included as a means of complying with [CS 23.2510](#)

## 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 significantly 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.

### AMC1 23.2515 Electrical and electronic system lightning protection

#### ASTM F44 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

9.4 *Electrical and Electronic System Lightning Protection:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

### 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

9.5 *High Intensity Radiated Fields (HIRF) Protection:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

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

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

9.6 *System Power Generation, Storage, and Distribution:*

[F2490-05](#) Standard Guide for Aircraft Electrical Load and Power Source Capacity

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3231/F3231M-17](#) Standard Specification for Electrical Systems in Small Aircraft

[F3235-17a](#) Standard Specification for Electrical Storage Batteries in Small Aircraft

[F3233/F3233M-17](#) Standard Specification for Instrumentation in Small Aircraft

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

[F3120-15](#) Standard Specification for Ice Protection for General Aviation Aircraft

### Remarks

Different from ASTM F3264-18b paragraph 9.6, ASTM F3235-17a is included as a means of complying with [CS 23.2525](#)

F3120-15 added as AMC

## 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

## 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

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 9.7 External and Cockpit Lighting:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3233/F3233M-17](#) Standard Specification for Instrumentation in Small Aircraft

[F3234/F3234M-17](#) Standard Specification for Exterior Lighting in Small Aircraft

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

[F3120-15](#) Standard Specification for Ice Protection for General Aviation Aircraft

#### **Remarks**

F3117 revised from -15 to -18b

F3120-15 added as AMC

## **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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification**

9.8 *Safety Equipment:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

## **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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

9.9 *Flight in Icing Conditions:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3233/F3233M-17](#) Standard Specification for Instrumentation in Small Aircraft

[F3120/F3120M-15](#) Standard Specification for Ice Protection for General Aviation Aircraft

## AMC2 23.2540 Flight in icing conditions

### CS-23 Amdt 4

23.1323 Airspeed indicating system

23.1325(b), (g) Static pressure system

23.1419 Ice protection

23.775(f) Windshields and windows

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

9.10 *Pressurized System Elements:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3229/F3229M-17](#) Standard Practice for Static Pressure System Tests in Small Aircraft

#### **Remarks**

F3229-17 added as AMC

## **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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification**

9.12 *Installation of Cockpit recorders:*

[F3061/F3061M-17](#) 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-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3228-17](#) Standard Specification for Flight Data and Voice Recording in Small Aircraft

## **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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

##### 10.1 Flightcrew Compartment Interface:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3232/F3232M-17](#) Standard Specification for Flight Controls in Small Aircraft

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

[F3063/F3063M-18a](#) Standard Specification for Aircraft Fuel and Energy Storage and Delivery

[F3064/F3064M-18a](#) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

#### Remarks

F3062 revised from -16 to -18

F3063 revised from -16a to -18a

F3064 revised from -15 to -18a

F3117 revised from -15 to -18b

Except as follows:

ASTM F3264-17 does not contain standards for windshield luminous transmittance. Windshield luminous transmittance must be addressed in showing compliance with [CS 23.2600\(a\)](#). Applicants may use the provisions of CS 23.775(e) at amendment as a means of complying with CS 23.2600(a), or may propose a different means of compliance in accordance with [CS 23.2010](#).

ASTM F3264-17 does not contain standards that ensure 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](#).

## **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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification**

#### *10.2 Installation and Operation Information:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3232/F3232M-17](#) Standard Specification for Flight Controls in Small Aircraft

[F3233/F3233M-17](#) Standard Specification for Instrumentation in Small Aircraft

[F3231/F3231M-17](#) Standard Specification for Electrical Systems in Small Aircraft

[F3227/F3227M-17](#) Standard Specification for Environmental Systems in Small Aircraft

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

[F3063/F3063M-18a](#) Standard Specification for Aircraft Fuel and Energy Storage and Delivery

[F3064/F3064M-18a](#) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

[F3120/F3120M-15](#) Standard Specification for Ice Protection for General Aviation Aircraft

### **Remarks**

F3062 revised from -16 to -18

F3063 revised from -16a to -18a

F3064 revised from -15\* to -18a

\* F3064-15 § 6.2.1 must be complemented. F3064-18 § 6.2.1.6 provides this AMC.

F3117 revised from -15 to -18b

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification**

*10.3 Instrument Markings, Control Markings, and Placards:*

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3063/F3063M-18a](#) Standard Specification for Aircraft Fuel and Energy Storage and Delivery

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

[F3120-15](#) Standard Specification for Ice Protection for General Aviation Aircraft

**Remarks**

F3063 revised from -16a to -18a

F3117 revised from -15 to -18b

F3120-15 added as AMC

**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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

#### 10.4 Flight, Navigation, and Powerplant Instruments:

[F3061/F3061M-17](#) Standard Specification for Systems and Equipment in Small Aircraft

[F3062/F3062M-18](#) Standard Specification for Aircraft Powerplant Installation

[F3064/F3064M-18a](#) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

#### Remarks

F3062 revised from -16 to -18

F3064 revised from -15\* to -18a

\* F3064-15 § 6.2.1 must be complemented. F3064-18 § 6.2.1.6 provides this AMC.

## 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 provides this AMC.

**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 provides 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification**

10.5 *Airplane Flight Manual*:

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

[F3174/F3174M-18](#) Standard Specification for Establishing Operating Limitations and Information for Aeroplanes

[F3120-15](#) Standard Specification for Ice Protection for General Aviation Aircraft

**Remarks**

F3117 revised from -15 to -18b

F3174 revised from -15 to -18

F3120-15 added as AMC

## 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 F3264-18b Standard Specification for Normal Category Aeroplanes Certification

10.6 *Instructions for Continued Airworthiness:*

[F3120/F3120M-15](#) Standard Specification for Ice Protection for General Aviation Aircraft

[F3117-18b](#) Standard Specification for Crew Interface in Aircraft

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**Remarks**

F3117 revised from -15 to -18b

**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