European Union Aviation Safety Agency

Explanatory Note to Decision 2023/002/R

Regular update of the Certification Specifications for Normal-Category Aeroplanes

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

RELATED NPA: 2022-103 — RMT.0687

EXECUTIVE SUMMARY

The objective of this Decision is to provide for state-of-the-art means of compliance with the Certification Specifications for Normal-Category Aeroplanes (CS-23).

This Decision amends CS-23 and the Acceptable Means of Compliance and Guidance Material to CS-23 (AMC & GM to CS-23) to incorporate 6 new and 23 revised consensus standards that are issued by the American Society for Testing and Materials (ASTM) International as an acceptable means of compliance with CS-23. EASA reviewed those amendments to the referenced standards that introduce state-of-the-art means of compliance, supporting global standardisation and harmonisation. In some cases, EASA complemented the incorporated ASTM consensus standards by remarks, to identify differences or limitations due to EASA's interpretation of these standards.

This Decision also introduces some additional changes to CS-23, as well as to the AMC & GM to CS-23.

This Decision is expected to improve efficiency whilst also maintaining a high level of safety.

Domain:	Design and production		
Related rules:	CS-23 and AMC & GM to CS-23		
Affected stakeholders:	Normal-category aeroplane manufacturers, design approval holders (DAHs), and design organisations dealing with supplemental type certificates (STCs), repairs or changes to normal-category aeroplanes.		
Driver:	Efficiency/proportionality	**Rulemaking group:**	No
Impact assessment:	Light		

EASA rulemaking procedure milestones

Start Terms of Reference	**Advisory Body Consultation** NPA 2022-103 (draft Decision)	**Proposal to the Commission** EASA Opinion	**Adoption by the Commission** Implementing/Delegated act	**Decision** Certification Specifications, Acceptable Means of Compliance, Guidance Material
9.8.2017	28.10.2022	n/a	n/a	7.3.2023

Table of contents

1. About this Decision

The European Union Aviation Safety Agency (EASA) developed Decision 2023/002/R in line with Regulation (EU) 2018/1139[1] (the 'Basic Regulation') and the Rulemaking Procedure[2].

This Rulemaking Task (RMT).0687 is included in Volume II of the European Plan for Aviation Safety (EPAS) for 2023-2025. The scope and timescales of the task were defined in the related Terms of Reference (ToR). RMT.0687 is an open-ended task to introduce changes into CS-23 and the AMC & GM to CS-23 by addressing non-complex and non-controversial issues.

EASA developed the *draft* text of this Decision. The EASA Advisory Bodies (ABs) were consulted through NPA 2022-103[3]. Comments were received from the EASA ABs during the consultation period.

EASA reviewed the comments received during the AB consultation. The comments received are summarised in Section 2.4.

EASA developed the *final* text of this Decision with the certification specifications (CSs), acceptable means of compliance (AMC) and guidance material (GM) based on the input from the consultation with the ABs, and published the Decision on the Official Publication[4] of EASA.

The major milestones of this RMT are presented on the cover page.

1 Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1535612134845&uri=CELEX:32018R1139).

2 EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 01-2022 of 2 May 2022 on the procedure to be applied by EASA for the issuing of opinions, certification specifications and other detailed specifications, acceptable means of compliance and guidance material ('Rulemaking Procedure'), and repealing Management Board Decision No 18-2015 (https://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-01-2022-rulemaking-procedure-repealing-mb).

3 In accordance with Article 6(2) and (3) the Rulemaking Procedure.

4 https://www.easa.europa.eu/official-publication

2. In summary — why and what

2.1. Why we need to amend the CSs, AMC and GM — issue/rationale

Pursuant to Article 4(1) of the Basic Regulation, EASA '[…] shall reflect the state of the art and best practices in the field of aviation, and take into account worldwide aviation experience and scientific and technical progress in the respective fields […]'.

There are misunderstandings in the interpretation of CS 23.2135(b). The objective of that certification specification is that the aeroplane is safely controllable during landing, using the approved procedures for the steepest approved approach gradient. Contrary to the current wording of said specification, it is not intended that such a procedure may result in aircraft damage and/or occupant injury. If this were the case, the specification would provide for a lower level of safety than the previous CS-23 Amendment 4. This would contravene the objective of maintaining the existing level of safety. Therefore, there is a need to clarify what is required from CS 23.2135(b).

The current AMC to CS-23 do not currently reflect the latest revisions of the ASTM International consensus standards that are considered as AMC to CS-23 specifications; they are therefore not up to date. This could result in new technology or design practices not being referenced in the AMC to CS-23. In addition, there is reduced harmonisation with partner authorities such as the Federal Aviation Administration (FAA) that have included these latest revisions of ASTM standards as AMC to Part 23.

In addition, EASA has received a safety recommendation (see accident report) that can only be addressed by amending the AMC to CS-23.

2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of the Basic Regulation. This Decision will contribute to achieving the overall objectives by addressing the issues described in Section 2.1.

The specific objective of this Decision is to provide for state-of-the-art technology and methods for showing compliance with the CS-23 requirements, based on the ATSM International consensus standards.

The objective of the amendment that stems from the safety recommendation is to provide for a quicker in-flight means to reset an electric circuit that is essential to flight safety instead of the more time-consuming replacement of a glass fuse.

2.3. How we want to achieve it — overview of the amendments

2.3.1 CS-23 Amendment 6

The wording of CS 23.2135(b) 'Controllability' has been amended to clarify its intent and prevent misinterpretation: 'without causing substantial damage or serious injury' has been removed and 'make a safe [landing]' reinserted. A similar wording was last used in CS 23.153(c) 'Control during landings' in CS-23 Amendment 4. The current text could be misinterpreted that it would be acceptable to allow some aircraft damage and/or occupant injury in the approved approach and landing procedure for the steepest approved approach gradient.

An editorial correction has been made to CS 23.2430: an erroneous reference to CS 23.2445(a)(7) has been replaced by the correct reference to CS 23.2445(g).

The text of CS 23.2515 has been harmonised with the text of CS 23.2520 by removing the word 'significantly' when describing the possible effects of lightning on aeroplane systems and the need for those systems to recover.

2.3.2 AMC & GM to CS-23 Issue 4

To provide up-to-date information and to promote innovation, EASA has incorporated 23 revised and 6 new consensus standards into AMC & GM to CS-23 Issue 4. The amendments follow the changes to the ASTM International consensus standards that are used by reference in the AMC to CS-23. ASTM F3264-21 'Standard Specification for Normal Category Aeroplanes Certification' (changed from F3264-18b to F3264-21) contains a list of the current ASTM F44 consensus standards that have been determined by consensus by ASTM International, to demonstrate compliance with the requirements for normal-category aeroplanes (which includes aeroplanes that are within the scope of CS-23). The amendments to the AMC & GM to CS-23 reflect whether and how the revised or new consensus standards, as listed in ASTM F3264-21, have been accepted and incorporated as AMC to CS-23.

GM1 23.2010 and GM2 23.2010 have been amended to reflect the amendments to CS-23 and the AMC & GM to CS-23. The example that was provided in GM2 23.2010 is no longer applicable since the referenced ASTM consensus standard has in the meantime been updated; GM2 23.2010 has therefore been updated to include the missing information.

The new GM3 23.2010 has been introduced including a list of all the ASTM F44 consensus standards and their revision levels as incorporated into the two most recent issues of the AMC & GM to CS-23 (Issues 3 and 4), to provide a better overview of the changes to those standards.

The following Section 2.3.3 provides the content changes to the ASTM F44 consensus standards, as well as EASA's position on those changes, in the numerical order of the referenced standards.

2.3.3 Revision from F3264-18b to F3264-21 — Summary of changes

<u>F2490-05 (changed to F2490-20) — Standard Guide for Aircraft Electrical Load and Power Source Capacity</u>

F2490 was reviewed and reissued with some editorial corrections. It was incorrectly referenced at specification level in F3264-18a and should have been shown as a standard referred to from F3231/F3231M and F3316/F3316M. This is corrected in F3264-21.

EASA has accepted that change and incorporated it into the AMC to CS-23.

<u>F3061/F3061M-17 to F3061/F3061M-20 Standard Specification for Systems and Equipment in Small Aircraft</u>

F3061 is an overarching standard that refers to specific revised/removed standards of various systems.

New referenced standards:

— F3173/F3173M Standard Specification for Aircraft Handling Characteristics;

— F3179/F3179M Standard Specification for Performance of Aircraft;

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

— F3316/F3316M Standard Specification for Electrical Systems for Aircraft with Electric or Hybrid Electric Propulsion; and

— F3367 Standard Practice for Simplified Methods for Addressing High-Intensity Radiated Fields (HIRF) and Indirect Effects of Lightning on Aircraft.

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

The intent was that F3082 would be an overarching standard for the various flight documents. This approach is no longer used within the flight subcommittee, making the standard F3082/F3082M references incorrect. References to F3082 have been replaced by references to the 'lower-level' flight documents that contain the intended referential information, as follows:

— in Section 3.2.2, F3082 has been replaced by a reference to F3173;

— in Section 13.9.3, F3082 has been replaced by a reference to F3179;

— in Section 13.9.5, F3082 has been replaced by a reference to F3179; and

— in F3082, Table 12 in the note has been replaced by a reference to F3179.

EASA has accepted those changes and incorporated them into the AMC to CS-23. In AMC1 to CS-23, the following amendments have been introduced regarding the links and/or references to the F3061 Standard:

— AMC1 23.2225 Component loading conditions

A new link from F3061 to F3232 has been introduced (for details, see F3232 described below).

— AMC1 23.2240 Structural durability

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2245 Aeroelasticity

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2250 Design and construction principles

A new link from F3061 to F3232 has been introduced (for details, see F3232 described below).

— AMC1 23.2255 Protection of structure

A new link from F3061 to F3232 has been introduced (for details, see F3232 described below).

— AMC1 23.2265 Special factors of safety

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2270 Emergency conditions

A new link from F3061 to F3232 has been introduced (for details, see F3232 described below).

— AMC1 23.2300 Flight control systems

A new link from F3061 to F3232 has been introduced (for details, see F3232 described below).

— AMC1 23.2305 Landing gear systems

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2310 Buoyancy for seaplanes and amphibians

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2315 Means of egress and emergency exits

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2320 Occupant physical environment

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2325 Fire protection

A new link from F3061 to F3231 has been introduced (for details, see F3231 described below).

— AMC1 23.2330 Fire protection in designated fire zones

A new link from F3061 to F3231 has been introduced (for details, see F3231 described below).

— AMC1 23.2335 Lightning protection

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2410 Powerplant installation hazard assessment

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2440 Powerplant installation fire protection

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2500 General requirements on systems and equipment function

The link from F3061 to F3231 has been revised (for details, see F3231 described below).

— AMC1 23.2505 General requirements on equipment installation

The link from F3061 to F3231 has been revised (for details, see F3231 described below).

— AMC1 23.2510 Equipment, systems, and installations

The link from F3061 to F3230 has been revised (for details, see F3230 described below).

— AMC1 23.2515 Electrical and electronic system lightning protection

References have been changed because of the revision to F3061. However, the referenced F3367 ‘Standard Practice for Simplified Methods for Addressing High-Intensity Radiated Fields (HIRF) and Indirect Effects of Lightning on Aircraft’ in F3061 has not been accepted. In addition, a remark has been added to amend paragraphs 17.3.1 to 17.3.4.

— AMC1 23.2520 High-intensity radiated fields (HIRF) protection

References have been changed because of the revision to F3061. However, the referenced F3367 ‘Standard Practice for Simplified Methods for Addressing High-Intensity Radiated Fields (HIRF) and Indirect Effects of Lightning on Aircraft’ in F3061 has not been accepted. In addition, a remark has been added to amend paragraphs 17.3.1 to 17.3.4.

— AMC1 23.2525 System power generation, storage, and distribution

The link from F3061 to F3231 has been revised (for details, see F3231 described below).

— AMC1 23.2530 External and cockpit lighting

The link from F3061 to F3233 has been revised (for details, see F3233 described below).

— AMC1 23.2535 Safety equipment

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2540 Flight in icing conditions

The link from F3061 to F3233 has been revised (for details, see F3233 described below).

— AMC1 23.2545 Pressurised systems elements

References have been changed because of the revision to F3061 (no technical change).

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

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2600 Flight crew compartment

The link from F3061 to F3232 has been revised (for details, see F3232 described below).

— AMC1 23.2605 Installation and operation information

The links from F3061 to F3227, F3231, F3232 and F3233 have been revised (for details, see F3227, F3231, F3232, and F3233 described below).

— AMC1 23.2610 Instrument markings, control markings and placards

References have been changed because of the revision to F3061 (no technical change).

— AMC1 23.2615 Flight, navigation, and powerplant instruments

References have been changed because of the revision to F3061 (no technical change).

F3062/F3062M-18 (changed to F3062/F3062M-20) Standard Specification for Aircraft Powerplant Installation

Section 4.1 and Appendix X1 have been changed to clarify the applicability of engine specifications.

Section 5.2.5 has been added to provide alternative design provisions for the override means for the alternate induction air door.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3063/F3063M-18a (changed to F3063/F3063M-20) Standard Specification for Aircraft Fuel Storage and Delivery

The word ‘energy’ has been removed from the title since this standard only addresses fuel storage, but, for instance, not battery systems.

EASA has accepted that change and incorporated it into the AMC to CS-23.

F3064/F3064M-18a (changed to F3064/F3064M-21) Standard Specification for Aircraft Powerplant Control, Operation, and Indication

Redundant information that is already captured in F3117 has been removed from Sections 4.2.1.2, 6.2.1.1, and 6.2.1.2. In addition, new references to F3233 ‘Standard Specification for Flight and

Navigation Instruments in Aircraft' and F3432 'Standard Practice for Powerplant Instruments' have been introduced (for details, see F3232 and F3432 described below).

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3065/F3065M-18 (changed to F3065/F3065M-21a) Standard Specification for Aircraft Propeller System Installation

For propellers, the content of Section 4.3 has been replaced by references to the applicable requirements in CS-P or CS-22, Subpart J.

The new Annex A1 has been introduced to provide the correlation between this Standard and the relevant CSs in CS-23.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

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

This Standard has not been revised; however, the reference to this Standard has been introduced into AMC1 23.2240 'Structural durability'.

F3083/F3083M-16 (changed to F3083/F3083M-20a) Standard Specification for Emergency Conditions, Occupant Safety and Accommodations

References to F3061 and F3179 have been introduced into this Standard.

The 15.0 g forward requirement for engines that are installed behind and above the seating compartment, as well as the 18.0 g forward requirement for engines that are installed inside the fuselage aft of the cabin, fall within the wider scope of powerplant as well as of energy storage system (ESS) and motor(s) installed in such a configuration.

The scope of aeroplanes to which the crashworthiness requirements for aircraft with a weight below 2 722 kg (6 000 lb) that do not meet the climb requirement of CS 23.67(a)(1) apply has been replaced by the scope of Level 1 and Level 2 aeroplanes, and by referring to the F3179/F3179M Standard 'Specification for Performance of Aircraft'.

In Section 4.2.6, an additional seat/restraint system design option has been introduced for Level 1 or Level 2 aeroplanes with a stalling speed of not more than 113 km/h (61 kt) in the landing configuration.

A new reference to this Standard has been introduced into AMC1 23.2535 'Safety equipment'.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3093/F3093M-15 (changed to F3093/F3093M-21) Standard Specification for Aeroelasticity Requirements

In Section 2, the titles and numbering of the referenced documents F3065/F3065M and F3115/F315M have been corrected, and a reference to F3120/F3120M 'Standard Specification for Ice Protection for General Aviation Aircraft' has been introduced.

Section 4.10.3 has been corrected to address ice protection design provisions including flutter and to refer to the applicable Standard F3120/F3120M.

The new Annex A1 has been introduced to provide the correlation between this Standard and the relevant CSs in CS-23.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3114-15 (changed to F3114-21) Standard Specification for Structures

The design provisions in Section 4.5. 'Vibration and Buffeting' have been removed since they were duplicated in Standard F3173/F3173M; the missing 'Mass Balance' design provision has also been introduced.

Section 4.7.7 has been added to this Standard to introduce the missing requirements of CS 23.775(e) that the windshield and side windows forward of the pilot's back, when the pilot is seated in the normal flight position, must have a luminous transmittance value of not less than 70 %. A new reference to this Standard has been introduced into AMC1 23.2600 'Flight crew compartment', and the related remark in said AMC, which served to fill the gap of the missing provision, has been deleted.

The details on the material strength properties in Section 6.3 have been removed from this Standard since they are covered by F3380-19 'Standard Practice for Structural Compliance of Very Light Aeroplanes'.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

In addition, a new reference to F3380-19 'Standard Practice for Structural Compliance of Very Light Aeroplanes', as a lower level to F3114-21, has been introduced into the following AMC:

— AMC1 23.2240 Structural durability;

— AMC1 23.2250 Design and construction principles;

— AMC1 23.2255 Protection of structure;

— AMC1 23.2260 Materials and processes; and

— AMC1 23.2265 Special factors of safety.

F3115/F3115M-15 (changed to F3115/F3115M-20) Standard Specification for Structural Durability for Small Aeroplanes

This Standard has been extensively rewritten to incorporate all tiering and performance-based design provisions.

The references to the following Standards have been introduced into this Standard:

— F3066/F3066M Standard Specification for Aircraft Powerplant Installation Hazard Mitigation;

— F3116/F3116M Standard Specification for Design Loads and Conditions;

— F3174/F3174M Standard Specification for Establishing Operating Limitations and Information for Aeroplanes; and

— F3380 Practice for Structural Compliance of Very Light Aeroplanes.

Section 3 'Definitions'

Definitions are now more appropriate for both metallic and composite components. A specific definition for catastrophic loss or catastrophic failure has been introduced to support the addition of limiting criteria for structural criticality, which are now also used in this Standard.

A new 'life (or load) enhancement factor' has been introduced to serve as an additional explanation of the criteria for safe life determination of composite components.

Section 4 ‘Evaluation for Aircraft Structure’

A new Section has been introduced to address which structural components require a durability assessment. That information was previously located in various sections. The information on the evaluation of metallic structure has been moved to Section 6.

The intent of CS 23.627, which was found to be missing, has been introduced into F3115 as AMC1 23.2240 ‘Structural durability’, as text listing the structural components that require a durability analysis based on the material and criticality, which was previously located in various sections. Criteria for the use of service experience for both metallic and composite material have been introduced, while the criteria in the previous revision were only applicable to unpressurised metallic structure. The new applicability to composite material has been defined, which includes the use of process similarity.

Section 5 ‘Load Considerations’

A new Section has been created to address fatigue load considerations. The information in that Section was previously located in Section 4. The information that was previously located in Section 5 has been moved to Section 7. The original fatigue load criteria were only applicable to metallic structure. The criteria are now applicable to both metallic and composite materials. Text on loading effects due to configuration changes has been introduced. Dynamic loading events (buffet and vibration) have been also clarified.

Section 6 ‘Metallic Structure Evaluations’

A new Section has been created to identify the evaluation options for all metallic structures, and provide a single set of criteria to address both pressurised and non-pressurised metallic structure.

The wording used for fatigue strength evaluation has been clarified to state that a safe life value must be established. Criteria for the use of an equivalent cyclic load spectrum have been introduced. The use of F3380 ‘Standard Practice for Structural Compliance of Very Light Aeroplanes’, in lieu of a cyclic test, has also been introduced as an option.

The fail-safe strength evaluation has been revised. The application of fail-safe strength evaluation to a principal structural element has been removed, and instead, catastrophic failure criteria are used when performing the evaluation. Appropriate text has been introduced to identify the mode and extent of the damage. An ‘obvious’ partial failure has been clarified, as well as what additional procedures are considered acceptable to prevent loss of the fail-safe capability. The fail-safe load design provisions have been reduced to be consistent with the fail-safe loads that were previously applicable in 14 Code of Federal Regulations (CFR) Part 23 Amendment 63.

Manufacturing defects have been also introduced into the list of probable damage causes to be considered in the damage tolerance evaluation.

Section 7 ‘Composite Structure Evaluations’

The term ‘corrosion’ has been replaced with ‘environmental effects’ in the damage tolerance evaluation, and additional residual-strength load criteria for structure demonstrating slow or arrested damage growth have been introduced.

Section 8 'Residual Strength Loads'

This new Section has been introduced. The information in this Section was originally located in Sections 4 and 5.

Section 9 'Substantiation of Bonded Structure'

The information in this Section was originally located in Section 6. The applicability of the criteria has been clarified to apply to bonds in both metallic and composite structure. The applicability has been changed to all aircraft levels (Level 1 through 4). The criteria for demonstrating residual strength capability have been changed to remove the term 'analysis-only'. Further, a new option has been introduced for assessing the strength of critical structure, using F3380 'Standard Practice for Structural Compliance of Very Light Aeroplanes'.

Section 10 'Inspections and Other Procedures'

Some of the information in this Section was originally located in Section 7. The reference to the Instructions for Continued Airworthiness (ICA) has been updated. In addition, criteria have been introduced to update the ICA for severe usage.

The new Annex A1 has been introduced to provide the correlation between this Standard and the relevant CSs in CS-23.

The new reference to F3380-19 'Standard Practice for Structural Compliance of Very Light Aeroplanes', as a lower level to F3115-20, has been introduced into AMC1 23.2240 'Structural durability'.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3116/F3116M-18 (changed to F3116/F3116M-18e2) Standard Specification for Design Loads and Conditions

The Standard has been revised to correct editorial errors; the technical content is unchanged.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3117/F3117M-18b (changed to F3117/F3117M-20) Standard Specification for Crew Interface in Aircraft

Section 5.6 has been changed to clarify the switch design provisions that are associated with master switches and protected switches. Sections 13.3.7 and 13.3.8 have changed from 'tape' to 'display' to be less prescriptive; Section 13.9.6 has been also made less prescriptive.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3120/F3120M-15 (changed to F3120/F3120M-20) Standard Specification for Ice Protection for General Aviation Aircraft

The new Section 4.2 'Similarity' has been introduced to address how similarity may be an acceptable means of compliance for any system or component, not only for air data systems.

Section 6 has been revised to clarify the design provisions for substantiating ice shedding compliance, including break-up allowances in accordance with the current advisory material and industry practices.

In Section 8.1.1.3, the text has been revised to be consistent with that used in Section 8.4.2, which has been updated to correct the definition of high speed.

In Section 8.4.1, an angle of attack/stall warning heat activation design provision has been introduced for when the de-ice capability is not demonstrated.

In Section 8.4.2, the 250-knot calibrated airspeed (KCAS) threshold has been deleted to ensure that only high-performance aeroplanes are subject to mixed-phase and ice crystal pitot design provisions. Angle of Attack (AOA) vane type sensors require faceplate ice protection to ensure that the base of the vane does not freeze up in ice crystal conditions.

In Section 8.5, text has been introduced to clarify the acceptable design provisions and reduce the need for certification review items (CRIs) (issue papers) when applying this Standard.

In Section 8.5, text has been introduced to correct the turbine engine certification requirements in continuous maximum and intermittent maximum conditions and to clarify when supercooled large droplets (SLD) conditions are required.

In Sections 9.1.9 through 9.1.10, and in the new Annex A4, the guidance material has been changed, affecting designs and providing alleviation in some areas of testing.

Annex A1 has been amended to remove ambiguity from the design provisions and provide for alleviation in some areas that can lead to a reduction in the test provisions. Changes have been incorporated into the current guidance material and current industry practices.

The previous releases of this Standard did not include in Table A1.1 the engine-out take-off climb gradient provisions for high-speed aeroplanes and all Level 4 aeroplanes, as required prior to Part 23 Amendment 64, thus incorrectly requiring Level 1 and 2 aeroplanes to address discontinued approach climb gradients. This revision of the Standard now reflects the same level of safety that existed prior to Amendment 64.

The previous releases of this Standard also omitted in Sections A1.1.1.3 and A1.1.1.5 to address the take-off speeds and take-off flight path provisions of F3179/F3179M for icing conditions for Level 1 and 2 high-speed multi-engined aeroplanes, which has been now corrected.

Text that has been introduced into Section A1.1.4.2 and Annex A3 clarifies the acceptable design provisions and reduces the need for CRIs (issue papers) when applying the ASTM consensus standard. It also provides a practical means of compliance with CS 23.2540(b), which allows modifiers of aeroplanes that were certified for icing based on Part 23 Amendment 43 or previous, who may not have the original equipment manufacturer (OEM) data, to add a critical, safety-enhancing feature.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3173/F3173M-17 (changed to F3173/F3173M-21) Standard Specification for Aircraft Handling Characteristics

Certification project experience has revealed the need for additional clarity to:

— ensure consistent interpretation of the intended and appropriate use of power changes during the test; and

— provide a clear description of an end point for the test.

Text that clarifies the test procedure has been introduced, which more specifically addresses the intended use of power changes during the test and defines an end point for the test: ‘Power must not be reduced during the level acceleration unless a flap speed exceedance (VFE of the initial position) is

imminent. The manoeuvre is completed when the flaps have reached the selected position and the airspeed is not less than 1.3 VS1.'

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3174/F3174M-18 (changed to F3174/F3174M-19) Standard Specification for Establishing Operating Limitations and Information for Aeroplanes

Section 4.2.3 has been amended to remove the power-plant-specific discriminator 'turbine aeroplane' and to clarify that VD/MD is established based on a minimum speed margin between VC/MC and VD/MD under F3116.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3179/F3179M-18 (changed to F3179/F3179M-20) Standard Specification for Performance of Aircraft

Section 4.2.3 has been amended to remove the power-plant-specific discriminator and clarify its intent.

The erroneously removed accelerate-stop distance in Section 4.7 of Part 23 Amendment 62 has been reinserted.

Sections 6.2.1 and 6.2.3 have been changed to better include the original intent of the Certification Specifications for Very light Aeroplanes (CS-VLA) that does not differentiate between low speed and high speed, and is only applicable to single-engined aeroplanes.

Section 10.1.2 has been changed to restore the original intent of Part 23 Amendment 62.

In general, the term 'cowl flaps' has been replaced with the more generic 'any means for controlling the cooling of the engine'.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3180/F3180M-18 (changed to F3180/F3180M-21) Standard Specification for Low-Speed Flight Characteristics of Aircraft

Several section titles have been introduced for clarity, and editorial errors have been corrected. In Section 4.4.2.3, subparagraph (3) has been removed.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3227/F3227M-17 (changed to F3227/F3227M-21) Standard Specification for Environmental Systems in Aircraft

The applicability table previously showed an exemption from the design provisions for harmful or hazardous concentrations of gases and vapours as well as for smoke evacuation for low-altitude aircraft. That exemption has been removed.

Section 5.1.8 has been changed to remove the specific altitude provision, to explain what constitutes a high-altitude airfield, and to clarify when to cease high-altitude operations.

Section 7 has been added based on CS 23.773(b) to address the potential for fog or frost obscuring the pilot's view. Consequently, the previously entered remark in AMC1 23.2600 has been removed.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

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

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

F3230-17 (changed to F3230-20a) Standard Practice for Safety Assessment of Systems and Equipment in Small Aircraft

Section 2 has been corrected to reflect the following previously included referenced standards:

— ETSO-C26d Aircraft Wheels and Wheel-Brake Assemblies (CS-23, CS-27, and CS-29 aircraft);

— MIL-PRF-87257 Hydraulic Fluid, Fire Resistant, Low Temperature Synthetic Hydrocarbon Base, Aircraft and Missile;

— DO-160 Environmental Conditions and Test Procedures for Airborne Equipment;

— SAE ARP4761 Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment; and

— SAE AS5714 Minimum Performance Standard for Parts 23, 27, and 29 Aircraft Wheels, Brakes, and Wheel and Brake Assemblies.

Editorial changes have been made to Sections 3 and 4 (e.g. capital letters removed from 'hazardous failure condition'). In addition, the term 'Airworthiness level' has been replaced by 'Aeroplane Certification Level' to be consistent with the definitions in CS-23.

Except for Section 4.2.4.1, EASA has accepted those changes and incorporated them into the AMC to CS 23.

F3231/F3231M-17 (changed to F3231/F3231M-21) Standard Specification for Electrical Systems for Aircraft with Combustion Engine Electrical Power Generation

A new reference to F3316/F3316M that covers electrical systems of aircraft with electrical propulsion has been introduced.

Sections 4.3.6 and 4.3.7 have been revised, and Sections 4.3.6.1, 4.3.6.2, and 4.3.6.3 have been introduced to provide for a clearer correlation of this Standard as means of compliance with CS 23.2525(c) between 14 CFR Part 23 Amendment 64 and EASA CS-23 Amendment 5.

Section 4.5.2 has been revised to cover two different means of power disconnection. Section 4.5.2.1 has retained the original wording of Section 4.5.2, and Section 4.5.2.2 has been introduced to allow to remotely disconnect power feeders as long as they have fault detection that automatically de-energises the source if a fault is detected.

Section 4.2.15 has been revised to separate the design provisions for external power connections between those for the aeroplane and those for the ground personnel.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3232/F3232M-17 (changed to F3232/F3232M-20) Standard Specification for Flight Controls in Small Aircraft

The term 'aeroplane certification level' has been harmonised with CS-23.

A new Section 5.4 has been introduced to capture the link to the new F3180.

A new Section 4.4.6 has been introduced to maintain the level of safety for failures in primary flight controls from CS 23.677(b)(1)/Federal Aviation Regulation (FAR) 23.677(b)(1), and CS-VLA.

A new Section 4.4.10 has been introduced to incorporate an accepted standard for powered trim system runaways based on CS 23.677(d)/FAR 23.677(d), using updated system safety terminology.

Section 4.13 has been amended to clarify that four options are available to address unsafe wing flap asymmetry, and that any of the four options may be used. These options are specified in Sections 4.13.1, 4.13.2, 4.13.3, and 4.13.4.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3233/F3233M-17 (changed to F3233/F3233M-21) Standard Specification for Instrumentation in Small Aircraft

Table 1 and Sections 4.2.7, 4.4.5, 4.4.10, 4.6.2, and 4.6.3 have been changed to add a missing exclusion circle for Certification Level 1 aircraft to the existing exclusions for low stall speed and day meteorological conditions. Table 1 and Sections 4.5.1.2, 4.5.1.3, 4.5.1.4, and 4.5.1.5 have been also changed to correct a typographical error and add a missing exclusion mark for Certification Level 1 aircraft to the existing exclusions.

The incorrect reference to F3082/F3082M in Section 4.1.6 has been corrected to read F3174/F3174M.

Other sections have been amended to better reflect that the standards are a means of showing compliance with a requirement.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

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

F3235-17a (unchanged) Standard Specification for Aircraft Storage Batteries

Based on experience from recent certification projects, a remark has been added to explain that the F3235 17a Standards alone are not complete and must be complemented by additional means of compliance.

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

F3239-19 (new) Standard Specification for Aircraft Electric Propulsion Systems

This new ASTM F44 Standard addresses airworthiness provisions for the design and installation of electric propulsion systems for aeroplanes. Hybrid electric propulsion systems are addressed implicitly, unless explicitly stated otherwise. This Standard has been developed focusing on electric propulsion systems with conventional system layout, propulsion characteristics, and operation.

F3239-19 has not been introduced as an AMC to CS 23 since, at the time of its publication, there was insufficient experience with the related designs. It has been therefore only included as a note to several requirements in CS-23, Subpart E, to highlight that it may be used for developing an AMC within specific certification projects.

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

This new ASTM F44 Standard addresses airworthiness provisions for aeroplanes that are equipped with systems:

— where the intended function of those systems is to alter an aeroplane's structural design envelope; or

— whose failure or malfunction would adversely affect the structural performance of the aeroplane.

Such systems include, but are not limited to, active flight control systems, stability augmentation systems, load alleviation systems, flutter control systems, flight envelope protection systems, control surface-limiting systems, rudder bias systems, autopilot systems, and fuel management systems.

This new Standard addresses the direct structural consequences of the system responses and the performance of such systems.

EASA has accepted those changes and incorporated them into the AMC to CS-23.

F3309/F3309M-18 (changed to F3309/F3309M-20) Standard Practice for Simplified Safety Assessment of Systems and Equipment in Small Aircraft

Below Table 1, a note has been added to explain that the phrases under each failure condition classification are descriptions of the likely consequences of a given failure condition and not necessarily absolute criteria for classifying that failure condition.

In Section 3, the term 'on the order of' has been introduced to recognise that, for various reasons, predictions about component failure rates are often not precise enough to accurately predict an absolute probability of occurrence. The text has been amended to apply that term more consistently when an applicant uses F3309/F3309M as a means of compliance.

A new Section 4.5.3.3 has been introduced to address single points of failure that result in hazardous failure conditions.

EASA has not accepted those changes and added appropriate remarks in the AMC to CS-23.

F3316/F3316M-19 (new) Standard Specification for Electrical Systems for Aircraft with Electric or Hybrid-Electric Propulsion

F3316-19 has not been introduced as an AMC to CS 23 since, at the time of its publication, there was insufficient experience with the related designs. It has been therefore only included as a note to several requirements in CS-23, Subpart E, to highlight that it may be used for developing an AMC within specific certification projects.

F3331-18 (unchanged) Standard Practice for Aircraft Water Loads

F3367-21 (new) Standard Practice for Simplified Methods for Addressing High-Intensity Radiated Fields (HIRF) and Indirect Effects of Lightning on Aircraft

The FAA developed an HIRF and Lightning policy paper for lower-end Part 23 aircraft systems that perform catastrophic functions. That paper has been used as the starting point and has been further developed for hazardous functions; the rationale behind this development was to make proportionate or tiered design provisions: where criticality is higher, the design provisions are higher, while lower-criticality systems have lower design provisions.

EASA has not accepted this new Standard and has not incorporated it into the AMC to CS-23.

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

This new Standard provides simplified methods for satisfying structural design provisions of very light aeroplanes. The material has been developed through open consensus of international experts in General Aviation (GA), focusing on single-engined, non-aerobatic aeroplanes with maximum two

people on board, a maximum take-off mass (MTOM) of not more than 750 kg, a stalling speed of not more than 83 km/h (45 kt) calibrated airspeed (CAS) in the landing configuration, and an unpressurised fuselage.

EASA has accepted this new Standard and incorporated it into the AMC to CS-23.

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

This new Standard provides an acceptable means of meeting the airworthiness requirements for the flight design loads and conditions of small normal-category Level 1 and 2 aeroplanes. The material has been developed through open consensus of international experts in GA.

This Standard provides means of compliance with CS 23.2200, CS 23.2210, CS 23.2215, and CS 23.2225, and addresses the following topics:

— simplified design load criteria;

— acceptable methods for control surface loads calculations;

— acceptable methods for primary control system loads calculations; and

— control surface loading (Level 1 aeroplanes)

EASA has accepted this new Standard and incorporated it into the AMC to CS-23.

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

This new Standard covers the minimum design provisions for the design of emergency parachute recovery systems for aircraft. Airframe emergency parachute systems that are addressed in this Standard refer to parachute systems that are designed, manufactured, and installed to recover the airframe and its occupants at a survivable rate of descent. This Standard is not applicable to deep-stall parachutes, spin recovery parachutes, drogue parachutes, or other airframe emergency aerodynamic decelerators that are not specifically intended for safely lowering the airframe and its occupants into the ground. The Standard is applicable only to such types of parachutes that are an integral part of an airframe emergency parachute system that is designed to recover the airframe and its occupants at a survivable rate of descent. The material has been developed through open consensus of international experts in GA.

This Standard covers the following topics:

— strength design provisions,

— parachute test method,

— activation system,

— deployment system,

— parachute attachment to the airframe,

— occupant protection, and

— system verification.

An Annex to this Standard provides detailed references that identify with which CS-23 requirements the sections of this Standard provide a means of compliance.

EASA has accepted this new Standard and incorporated it into the AMC to CS-23.

F3432-20a (new) Standard Practice for Powerplant Instruments

This Standard provides the minimum required powerplant instruments and describes how that information is provided to the flight crew or pilot of Normal Category Level 1, 2, 3, or 4 aeroplanes. It provides a list of acceptable powerplant instruments and a method for supplying the power plant information to the crew based on the type of the power plant installation.

This Standard also provides the following:

— criteria for mitigating the need for rate of change;

— direction of change; and

— proximity-to-limits information for some power plant instruments that are required to be provided.

This Standard applies to reciprocating and turbine-engined power plant requirements and provides a method of compliance with Section 6 of Standard F3064/F3064M.

EASA has accepted this new Standard and incorporated it into the AMC & GM to CS-23.

2.4. What are the stakeholders' views — outcome of the consultation

The outcome of the AB consultation was generally positive with only 16 comments, none of which were controversial.

The comments received were focused on the 'remarks' that have been added to the various ASTM standards. Commenters requested clarifications on these 'remarks' and requested their minimisation or removal all together. These comments have not resulted in any significant changes to the final text of the AMC & GM to CS-23. Comments relating to typographical and duplication errors have been also received and addressed in the final text.

2.5. What are the benefits and drawbacks of the amendments

CS-23 Amendment 6 clarifies the intent of CS 23.2135(b) to provide for a common understanding of this requirement.

This revision to the AMC & GM to CS-23 introduces changes into the referenced ASTM consensus standards in AMC1 to CS-23, which were made between Revisions 18b and 21 of F3264 'Standard Specification for Normal Category Aeroplanes Certification'. Between Revision 18b (published in December 2018) and Revision 21 (published in September 2021), 23 standards were changed, and 6 new standards were introduced. This amendment to CS-23 and the AMC & GM to CS-23 provides a set of up-to-date CSs, AMC, and GM that appropriately reflect the current technology that is utilised for the design of normal-category aeroplanes as well as the current best design practices that are used by industry to ensure a safe and airworthy product. This amendment also improves harmonisation with other certification authorities. This will result in reducing the need for CRIs and possible special conditions as well as validation activities, thus ultimately improving the efficiency of the certification process.

There are no drawbacks foreseen with the amendment to CS-23 and the AMC & GM to CS-23.

3. How we monitor and evaluate the amended CS, AMC and GM

EASA will evaluate the effective use of the ASTM consensus standards for the establishment of the certification programmes and for demonstrating compliance when those standards are applied to certification projects. This is expected to confirm the anticipated benefits of using those standards.

4. References

4.1. Related EU regulations

n/a

4.2. Related EASA decisions

— Decision No. 2003/14/RM of the Executive Director of the Agency of 14 November 2003 on certification specifications, including airworthiness codes and acceptable means of compliance for normal, utility, aerobatic and commuter category aeroplanes ('CS-23')

— Executive Director Decision 2017/025/R of 20 December 2017 issuing Acceptable Means of Compliance (AMC) and Guidance Material (GM) to Certification Specifications for Normal-Category Aeroplanes (CS-23) 'AMC/GM to CS-23 — Issue 1'

4.3. Other reference documents

n/a