Comment-Response Document 2016-05

Appendix
to ED Decision 2017/013/R

RELATED NPA 2016-05 — RMT.0498 — 29.3.2017

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1. Summary of the outcome of the consultation

Notice of Proposed Amendment (NPA) 2016-05 'Reorganisation of CS-23 (Related to US NPRM 16-01 'Revision of Airworthiness Standards Part 23')', which was published on the EASA website on 23 June 2016 and publicly consulted until 30 September 2016, proposed the reorganisation of CS-23 and CS-VLA by merging them into a single CS-23 containing objective requirements.

During the public consultation of NPA 2016-05 318 comments were received from 25 stakeholders, that is 9 national aviation authorities (NAAs) and 16 other users.

The proposed amendments constitute a concept change equivalent to the Federal Aviation Administration (FAA)-proposed change that was published in Notice of Proposed Rulemaking (NPRM) 16-01 on the restructuring of the Code of Federal Regulations (CFR) Title 14, Part 23 (hereinafter referred to as 'Part 23'). The FAA completed this rulemaking activity by publishing CFR 14, Part 23, Amendment 64 on 30 December 2016.

As explained in the NPA, and supported by various comments on the NPA, harmonisation between CS-23 and Part 23 is considered crucial for a global sustainable General Aviation (GA). For that reason, not only comments on NPA 2016-05 have been considered in drafting the new CS-23, but also CFR 14, Part 23, Amendment 64 and related comments.

The harmonisation starts with a common structure between the new CS-23 and Part 23; therefore, some restructuring and renumbering adjustments have been made. In that context, a summary of the comments received on NPA 2016-05 are provided below following the order of the new CS-23 requirements, and not the original NPA structure.

1.1. General comments

Many commenters expressed their strong support for the simplification of the certification specifications (CSs). However, the new concept introduced by CS-23 Amendment 5 generated a number of comments/concerns as well, as detailed below.

Some commenters were of the opinion that a number of requirements are not specific enough or that they leave too much room for interpretation. They suggested to reintroduce specific details into the new objective requirements in order to clarify the intent of each requirement.

EASA does not believe that it is necessary to reintroduce design-specific details back into the requirements in order to minimise the room for interpretation. Even without design-specific solutions, it is possible to provide an objective that can be met in various ways. The objective requirements are by nature open to various solutions that need further assessment at AMC level. On the other hand, it is also true that some of the details proposed for reintroduction are necessary for the correct and standardised implementation of certain design solutions. For that reason, these details will be moved to the design-specific AMC. However, a possible incorporation of those details into the objective requirements would close the door to any other equally safe solutions.

As specified in the following summary of topics under the sections dedicated to the different CS-23 Subparts, also a number of Part 23 rules have not been incorporated into EASA rules because they are believed to contain too many technical details. Even in the cases where the Part 23 rules reflect the current state of the art, it is expected that they will restrict near-future technological developments.

Especially where innovation is expected to provide safety-enhancing characteristics, EASA believes that these design-specific details should not be included in the requirements.

A number of comments were also made on using ASTM International consensus standards as acceptable means of compliance (AMC) to the new CS-23. Costs of these standards are mentioned as a potential hurdle for applicants. The current costs related to the availability of the standards were evaluated at the time that the Aviation Rulemaking Committee (ARC) developed this concept, and were considered acceptable. Also ASTM has experience in developing standards within the scope of the 'Light-Sport Rule', and was selected by industry for that reason. These ASTM standards, however, are not the only AMC; therefore, a new requirement (see CS 23.2010 below) has been introduced to make the process for using other AMC options more conspicuous.

1.2. SUBPART A — GENERAL

CS 23.2000 Applicability and definitions

The NPA 2016-05 language has been updated to match the Part 23 language as the meaning was identical. As also explained in Part 23, the definition in CS 23.2000(b) does not exclude single-engine aeroplanes. However, the definition of 'designated fire zones' has been removed since it created issues relating to the interpretation of this new definition. CS-23 thereby leaves it to the related AMC to provide technology-specific definitions, as required, thus ensuring compatibility of the rules with future technologies.

CS 23.2005 Certification of normal-category aeroplanes

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2010 Accepted means of compliance (new)

It was decided to introduce this requirement in line with Part 23, which explains that the AMC needs to be acceptable to EASA.

1.3. SUBPART B — FLIGHT

CS 23.2100 Mass and centre of gravity

The NPA language has been updated to match the Part 23 language as the meaning was identical. 'Mass' is used instead of 'weight'.

CS 23.2105 Performance data

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2110 Stall speed

The NPA language has been retained, referring to 'the most adverse conditions for each flight configuration', but not explicitly narrowing this down using power setting requirements. This is done to ensure compatibility with future technologies. The term 'configuration' keeps the requirement open to any parameter that may define a relevant configuration in the future, when, for example, thrust is used to ensure other functionalities as well, such as flight control or lift augmentation. The AMC will provide clarifications of atmospheric conditions.

CS 23.2115 Take-off performance

The NPA language has been updated to match the Part 23 language with some minor refinements as the meaning was identical. The ground roll and initial climb distance (CS 23.2115(c)(2)) has been corrected to read 11 m (35 ft), which is established practice today.

CS 23.2120 Climb requirements

CS 23.2120 contains the technical requirements, while CS 23.2170 provides the definition of what information needs to be provided in the Aeroplane Flight Manual. The related AMC will provide the technical details.

The climb requirements are a compromise between the NPA and Part 23 language.

As it was the case in the past, the requirement requires to determine climb performance for all engines operating, that is also for Level-4 multi-engine aeroplanes. In the past, complying with this requirement was never an issue, considering typically twin-engine aeroplanes. In view of future concepts with multiple (electric) engines in higher numbers, this may no more be the case, and the requirement may become relevant. The Part 23 language would not cover this case.

The term 'crashworthiness requirements for single-engine aeroplanes' that had not been defined is replaced by '*for Level-1 and -2 low-speed aeroplanes that do not meet single-engine crashworthiness requirements*, which is a description to be detailed in the AMC.

CS 23.2125 Climb information

The language used was part of CS 23.2120, as proposed in the NPA; however, CS 23.2120 has been partially merged with CS 23.2125 for harmonisation with the FAA. The NPA language has been maintained as the more stringent language used in Part 23 has the potential to restrict future standards development. This may be the case for future designs, considering the high number of distributed engines.

By using 'climb and/or descent', the CS-23 language appropriately covers single-engine aeroplanes without the need for a separate (b) requirement requiring determination of the glide path following loss of thrust.

CS 23.2130 Landing

EASA has adopted the Part 23 language, but uses 'mass' instead of 'weight', and ends CS 23.2130(b) without further specifying the consideration of stall speed safety margins and minimum control speeds. These details provided by Part 23 may be limiting for future and novel concepts, where other factors than stall speed safety margins and minimum control speeds might be of relevance.

CS 23.2135 Controllability

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2140 Trim

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2145 Stability

CS-23 is harmonised with Part 23, but CS 23.2145 uses 'stable control feedback' instead of 'stable control force feedback'. This also allows to accept an appropriate level of displacement feedback, which may be the preferred solution for some future flight control concepts.

CS 23.2150 Stall characteristics, stall warning, and spins

The EASA language is based on the Part 23 language with the following enhancements:

— Stall warning on aerobatic aeroplanes may be mutable for the aerobatics flight phase. This has been added on the basis of multiple comments received, and it reflects the current established and accepted practice.

— Addition of 'hazardously' in CS 23.2150(b) and (c) ensures that aeroplanes proven not to cause safety issues may continue to be accepted even when they modestly start departing from controlled flight. The details are to be defined by AMC.

— CS 23.2150(e) has been broadened to require safe recovery from all manoeuvres. Part 23 requires this only for spins. This was not considered to be sufficient for aeroplane safety, even for aerobatic use.

CS 23.2155 Ground- and water-handling characteristics

Part 23 language was adopted but in a more flexible and open way, by not referring to operation 'on land or water'. Already operation on snow using skis might be considered outside of this limitation, and would create a gap in the requirements.

CS 23.2160 Vibration, buffeting, and high-speed characteristics

The NPA language has been updated to match the Part 23 language as the meaning was identical.

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

The Part 23 language was adopted, only CS 23.2165(a) has been simplified by removing the reference to Part 25, Appendix C and some other conditions. Instead, 'Conditions for which certification is requested' is used. This is considered to be more open to future novel concepts, where other factors than those listed in CS-25, Appendix C may also become relevant. For the time being, CS-25, Appendix C will be referenced in the related AMC.

CS 23.2170 Operating limitations

The NPA language has been kept, the meaning is identical to 23.2620 of Part 23. This organisation of the requirements follows the logic that each specific Subpart establishes *what* the information is, while the Aircraft Flight Manual only specifies *how* this information needs to be provided. This is captured in CS 23.2620.

1.4. SUBPART C — STRUCTURES

CS 23.2200 Structural design envelope

The NPA language has been retained.

CS 23.2205 Interaction of systems and structures

The NPA language has been retained because it includes static aeroelasticity, which was omitted in Part 23. Also system malfunctions are not covered by Part 23.

CS 23.2210 Structural design loads

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2215 Flight load conditions

The NPA language has been retained because Part 23 is considered too detailed and design specific in relation to gust and asymmetric thrust due to engine failure.

CS 23.2220 Ground and water load conditions

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2225 Component loading conditions

The NPA language has been retained because Part 23 is considered too detailed and design specific.

CS 23.2230 Limit and ultimate loads

The NPA language has been retained because it provides a clearer link to CS 23.2265 'Special factors of safety'.

CS 23.2235 Structural strength

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2240 Structural durability

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2245 Aeroelasticity

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2250 Design and construction principles

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2255 Protection of structure

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2260 Materials and processes

The NPA language has partially been updated to match the Part 23 language as the meaning was identical.

CS 23.2265 Special factors of safety

The NPA language was identical to the Part 23 language.

CS 23.2270 Emergency conditions

The NPA language has been updated to match the Part 23 language as the meaning was identical.

1.5. SUBPART D — DESIGN AND CONSTRUCTION

CS 23.2300 Flight control systems

The NPA language has been updated to match the Part 23 language, except for the detailed information required for trim systems. This information is not in balance with the level of detail of other systems and has been condensed.

CS 23.2305 Landing gear systems

No change to the NPA text, only the numbering has been aligned with the Part 23 rule.

CS 23.2310 Buoyancy for seaplanes and amphibians

No change to the NPA text, only the numbering has been aligned with the Part 23 rule.

CS 23.2315 Means of egress and emergency exits

No change to the NPA text, only the numbering has been aligned with the Part 23 rule.

CS 23.2320 Occupant physical environment

The NPA language has been updated to match the Part 23 language, except for CS 23.2320(a)(2) where the scope is less prescriptive. Part 23 also includes a system hazard that should not be included in CS 23.2320 on the occupants' physical environment (cabin requirements).

CS 23.2325 Fire protection

No change to the proposed NPA text, only the numbering and title have been aligned with Part 23.

CS 23.2330 Fire protection in designated fire zones

No change to the NPA text that is aligned with Part 23, except for CS 23.2330(b). EASA is of the opinion that the risk of losing the weight of an engine from a designated fire zone is not the only risk that needs to be addressed. For instance, if a battery area would be designed as a designated fire zone, the effects of a fire in that zone should also not preclude a safe flight and landing. However, the numbering and title have been aligned with Part 23.

CS 23.2335 Lightning protection

In general, the NPA language has been updated to match the Part 23 language, however the proportionality to the exposure risks is kept in CS 23.2335(a). The numbering and title have been aligned with Part 23.

CS 23.2340 Design and construction information

The NPA language has been kept as the meaning is identical to 23.2620 of Part 23. This organisation of the requirements follows the logic that each specific Subpart establishes *what* the information is, while

the Aircraft Flight Manual only specifies *how* this information needs to be provided. This is captured in CS 23.2620.

1.6. SUBPART E — POWERPLANT INSTALLATION

The term 'powerplant installation' is used throughout this Subpart. Considering novel propulsion system architectures, as for example highly-distributed and integrated electric-propulsion systems with additional lift-enhancing use, the established term of 'powerplant' only might not capture that each component that is necessary for propulsion is included. This is explained in CS 23.2400(a).

CS 23.2400 Powerplant installation

The NPA language has been updated to match the Part 23 language to the extent possible. Considering future distributed and highly-integrated propulsion system concepts, obtaining a stand-alone type certificate (TC) for the 'engine' or 'propeller' may not be feasible anymore. Therefore, the CS 23.2400 language limits the mandate for a TC.

CS 23.2405 Power or thrust control systems

The Part 23 similar-rule language is directly targeted at established automatic systems, such as autothrottle systems. Future propulsion concepts, especially multi-engine electric-propulsion systems, will include significantly more systems of that nature. Therefore, the NPA language (CS 23.2405) was used as the basis of this requirement. The ordering of the paragraph has been amended in order to improve harmonisation with Part 23. Any system that intervenes with the power setting falls within the scope of this requirement and, therefore, thrust reverser systems are also covered by the requirement, making 23.2420 of Part 23 redundant. CS 23.2405(d)(2) was changed on the basis of comments received, claiming that the requirement would be limiting for novel safety-enhancing equipment when a safety benefit is more relevant than a potential hazard.

CS 23.2410 Powerplant installation hazard assessment

There are no fundamental changes to the NPA that is aligned with Part 23.

CS 23.2415 Powerplant installation ice protection

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2420 (reserved)

The number has been reserved in order to harmonise the CS-23 numbering with the Part 23 numbering.

CS 23.2425 Powerplant operational characteristics

The NPA language has been kept with minimal changes as the meaning was identical to 23.2425 of Part 23.

CS 23.2430 Powerplant, energy storage and distribution systems

The NPA language did break this requirement into separate logical elements. However, due to harmonisation reasons, CS 23.2430 follows the Part 23 structure and combines the issues. This requirements covers the content of the following NPA requirements:

CS 23.2440 Energy system — General

CS 23.2445 Energy system independence

CS 23.2450 Energy storage and supply system lightning protection

CS 23.2455 Energy transfer

CS 23.2460 Energy storage

CS 23.2465 Energy storage and supply systems installation

CS 23.2470 Energy medium pollution within storage and supply system

CS 23.2475 Energy storage filling/charging

CS 23.2480 Energy dump systems

Using the terms 'fuel' and 'powerplant' may become limiting for future and novel propulsion system concepts, so they have been kept out. Mandating consideration of 'lightning effects' was considered to be an unnecessary burden for small aeroplanes day/visual meteorological conditions (VMC) operations, or for novel concepts operating in very limited environments.

CS 23.2435 Powerplant installation support systems

No change to the NPA text that provides the objective, contrary to the Part 23 rule that is limited to 'air induction' and 'exhaust', which may become limiting for other propulsion system support systems.

CS 23.2440 Powerplant installation fire protection

No change to the NPA text that provides the objective, contrary to the Part 23 language that is descriptive and contains more detail. This maintains the inherent risk of rapid disconnects between the rule and industry standards that deal with upcoming technologies and novel design concepts.

The CS 23.2420 language is open to alternative propulsion concepts, as for example electric engines with battery overheat risk, instead of fuel burn.

CS 23.2445 Powerplant installation information

The NPA language has been kept as the meaning was identical to 23.2620 of Part 23. This organisation of the requirements follows the logic that each specific Subpart establishes *what* the information is, while the Aircraft Flight Manual only specifies *how* this information needs to be provided. This is captured in CS 23.2620.

1.7. SUBPART F — SYSTEMS AND EQUIPMENT

CS 23.2500 General requirements on systems and equipment function

The NPA language has been updated to match the intent of the Part 23 language.

CS 23.2505 General requirements on equipment installation

The NPA language has been updated to match the intent of the Part 23 language. The distribution of engine-driven accessories requirement is kept for now but will require further evaluation.

CS 23.2510 Equipment, systems, and installation

The NPA language has been updated to match the intent of the Part 23 language. The proposed definitions and Figure 1 in the NPA have been removed, and that information will be covered by the AMC.

CS 23.2515 Electrical and electronic system lightning protection

The NPA language has been kept with minimal changes as the meaning was identical to 23.2515 of Part 23. EASA is using 'exposure to lightning is likely', instead of being specific that this is applicable for instrument flight rules (IFR) operation.

CS 23.2520 High-intensity radiated fields (HIRF) protection

The NPA language has been updated to match the Part 23 language to the extent possible. CS 23.2520(2)(b) is not fully harmonised with Part 23 whose text would potentially exclude Level C systems.

CS 23.2525 System power generation, storage, and distribution

The NPA language has been kept with minimal changes as the meaning is identical to 23.2525 of Part 23.

CS 23.2530 External and cockpit lighting

The NPA language has been kept with minimal changes as the meaning was identical to 23.2530 of Part 23. The added CS 23.2530(e) was initially left out because it is not a requirement for aviation but boating; it is now reinserted for harmonisation reasons.

CS 23.2535 Safety equipment

The NPA language has been kept as the meaning was identical to 23.2535 of Part 23.

CS 23.2540 Flight in icing conditions

The CS 23.2165 NPA text has been considered in combination with the language of 23.2540 of Part 23. The Part 23 text has been kept and simplified by removing the reference to Part 25, Appendix C and some other conditions. This is considered to be more open to future novel concepts, where other factors than those listed in CS-25, Appendix C may also become relevant. For the time being, CS-25, Appendix C will be moved to the related AMC.

CS 23.2545 Pressurised systems elements

The NPA language has been updated to match the Part 23 language and some specific technical details have been removed.

CS 23.2550 (reserved)

The number has been reserved in order to harmonise the CS-23 numbering with the Part 23 numbering.

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

Part 23 uses legacy rule numbers and maintains the legacy contents unchanged due to cross-linking with other rules. Part 23 follows this logic even if the old language is known to create issues already today when considering modern recorder technology.

EASA uses high-level language in this requirement using numbers that Part 23 does not use otherwise. The current CS 23.1457 and CS 23.1459 already today differ from 23.1457 and 23.1459 of Part 23. Using a more abstract level of language for flight recorders allows for current as well as other and advanced solutions.

1.8. SUBPART G — FLIGHT CREW INTERFACE AND OTHER INFORMATION

CS 23.2600 Flight crew compartment

The NPA language has been kept. It leaves out details compared to the Part 23 language, but the meaning is identical.

CS 23.2605 Installation and operation information

The NPA language has been updated to match the Part 23 language to the extent possible. The NPA CS 23.2605(d) is kept specifically for safety equipment since it addresses the information provided to the occupants, and not just to the flight crew.

CS 23.2610 Instrument markings, control markings, and placards

The NPA language has been updated to match the Part 23 language as the meaning was identical.

CS 23.2615 Flight, navigation, and powerplant instruments

The NPA language has been updated to match the Part 23 language as the meaning was identical. The NPA CS 23.2615(c) text was already covered by the Aircraft Flight Manual requirements, and was therefore removed.

CS 23.2620 Aeroplane Flight Manual

The NPA language has been kept with only a numbering change for sequential logic. The content of both the Part 23 text and CS 23.2620 covers the same scope. However, what needs to be approved will depend on the future options provided by the new Regulation (EC) No 216/2008 (the EASA 'Basic Regulation'). Declaration of compliance is expected. Therefore, the prescriptive process requirements for approval are not included in the CS 23.2620 technical requirements.

CS 23.2625 Instructions for Continued Airworthiness

EASA uses high-level language in this requirement using numbers that Part 23 does not use otherwise. Part 23 contains procedural elements that cannot be harmonised with the technical requirements of CS-23.

2. Individual comments

(General comments)	-

comment	*4* comment by: *EUROCONTROL* The EUROCONTROL Agency does not have comments on Notice of Proposed Amendment 2016-05.
response	

comment	*5* comment by: *René Meier, Europe Air Sports* Europe Air Sports and its member federation European Powered Flying Union thank the Agency for preparing NPA 2016-05 on CS-23 / FAR Part 23 harmonisation. The texts we are discussing here offerm, in our opionion, the best possible compromise considering the fact that CS are "soft law", FAR Part 23, however, is "hard law". We welcome the integration of CS-VLA in the new CS-23 provisions. The flexibility these NPA texts offer are highly welcome: More possibilities for innovation combined with risk- and performance-based oversight will enhance development of up-to-date aeroplanes in the "level 1" and "level 2" segments, these two levels being most important for our members. As we asked for integrating CS-LSA as well when we commented on A-NPA 2015-06 we are interested to learn from the Agency if a plan exists for eventually integrate LSA later. We read on page 7/53 that the idea was abandoned for the time being because harmonsation could not be achieved, we are therefore looking forward to a future task amending the final outcome of the present NPA and offer our assistance.
response	

comment	*9* comment by: *René Meier, Europe Air Sports* Question from an insider: Should we add "Abbreviations, acronyms, definitions" as 7th chapter? Rationale: There are so many abbreviations and, especially, different "loads" (air, crictical, limit, ultimate, flight...) used in the NPA text that this could be helpful...
response	

comment	*24* comment by: *GE Aviation* **Clarity of language –** The language in many of the proposed rules is so high level and abstract that the general intent of the rule is now difficult to interpret. Use of plain language and more concrete terms is preferable, even if some generality is lost. The intended

	minimum requirement expected of all technologies should be clear within the rule.
response	

comment	*25* comment by: *GE Aviation* **General comment on the numbering** – It would be preferable for the existing numbering system to be retained as far as possible, to improve traceability of rules and permit rapid location of a rule by those familiar with the current numbering system. For example CS-23.2400 Powerplant Installation should be CS-23.901 Installation.
response	

comment	*26* comment by: *GE Aviation* **Scope of rules** Many of the current rules have language carefully developed to limit the rule scope. Broadening the rule language expands the scope to aspects never intended, which would increase the technical difficulty of compliance without providing a safety benefit. Moving qualifiers and limitations on the rule into externally developed standards risks losing clarity over the intent of the rule at the regulatory level. There is an overall goal of moving to objective rather than prescriptive rules; we are concerned that the rules retain enough specificity that the applicant and regulator have a common understanding of what compliance would involve. Comments and suggestions on specific rules are provided below
response	

comment	*27* comment by: *GE Aviation* **"likely" definition**. The term "likely" is used in multiple proposed rules and is critical to understanding the acceptable MOC. We request clarification within the rules of the meaning of "likely".
response	

comment	*39* comment by: *UK CAA* **Page No:** All **Paragraph No:** General **Comment:** It is recommended that a gap analysis between current FAR/CS23 ASTM and proposed ASTM should be made available, to assist both the applicants and authorities determining certification bases for products, including assessing the changed product rule. **Justification:** There may be some logistical issues to be overcome when contemplating changed product rule with regards to modifications to existing products certificated in accordance with previous amendments of CS-23, following this substantial reorganisation of both CS and FAR 23 codes.
response	

comment	*40* comment by: *UK CAA* **Page No:** All **Paragraph No:** Whole document – ASTM standards. **Comment:** The accessibility and cost implications for the proposed CS-23 referenced ASTM standards, once the free to view web access during the NPA comment period ends, should be fully evaluated before the proposals proceed. Consideration should be made to ensure that prospective additional access costs to the relevant ASTM are not significant, and downloadable ASTM content is available that can be incorporated into certification bases. **Justification:** It is questionable whether there should be a cost associated with gaining access to required safety-related material. It will form an additional (ASTM) annual subscription cost to each applicant seeking approval of a Part 23 type, (and also to the Regulators involved with the approval process). Current restrictions on ASTM availability may also pose a problem for applicants seeking to compile compliance plans and compliance checklists.
response	

comment	*56* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* The commentor supports the need of simplification of GA aircraft certification requirements and procedures. The commentor fully agree with the objective of this NPA 2016-05.
response	

comment	*57* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* The commentor supports the need of simplification of GA aircraft certification requirements and this NPA 2016-05. Any professionnal of Type Certification knows that the rule is important but the certification procedure too. In the recent Type Certifications, the EASA forgot the ELA certification procedure. The objectives were defined but the procedure does not exist yet. The commentor insists on the need to have a certification procedure. With this new rule allowing the Applicant to propose some AMCs, the need of a clear EASA certification procedure adapted to GA aircraft and small organization (which are allowed not to have neither DOA nor APDOA in some cases), is even more important.
response	

comment	*73* comment by: *Textron Aviation* 1. **General comment on the numbering** - There has to be a reason or purpose from going away from Subpart E being the 900 series rules. Change for changes sake is not always good. For those of us who have been working in the rules for a long time it would be nice to know that 900 series rules are still propulsion rules. Using the proposed numbering system will be confusing for those products with a mixed certification basis? It would seem to make the most sense to reuse previous rules numbers in the case where a new rule in similar in title or content and add new rule numbers as applicable. For example CS- 23.2400 Powerplant Installation should be CS-23.901

	Installation. 2. **Number of Energy / Fuel System Rules** - There seems to be a disproportional number of rules regarding energy / fuel storage and distribution as compared to the other aspects. Consolidation appears to be possible. 3. **Control and Indication** - There appears to be no mention regarding the standardization of control knobs / shapes and motion (push FWD go fast for example). This is a concern as it may lead to type ratings in simple aircraft. 4. **General Comment** – The rules previously suggested in EASA's A-NPA were far superior to the ones presented here after the attempt to merge the FAA's NPRM language.
response	

comment	*78* comment by: *Luftfahrt-Bundesamt* The LBA has no comments on NPA 2016-05.
response	

comment	*138* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* It is highly appreciated, that the NPA is written in a very clear and structured way and that the differences to the FAA NPRM including a rationale are highlighted. Full harmonization on the safety objectives and the accepted AMC (e.g. consensus industry standards) shall remain a high level goal. Numbering: - We support a numbering system where no numbers are reused for a different subject as today. - The numbering system should be consistent over all legal systems (EASA, FAA, ...) Language: Consider using passive voice instead of "The applicant must", e.g. "Each cockpit control must be marked ..."
response	

comment	*144* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* First DGAC France would like to thank EASA for the work performed on the principle of the simplification of certification specifications (CS) for general aviation aircraft. Moreover DGAC France supports the objective of this NPA and the creation of objective requirements and acceptable means of compliance.
response	

comment	*173* comment by: *Federal Office of Civil Aviation (FOCA), Switzerland* The Federal Office of Civil Aviation (FOCA) appreciates the opportunity to comment on this NPA.

	FOCA is of the opinion that the harmonization between EASA and FAA is of unique importance to the CS-23 reorganization. In our opinion, the current NPA still contains too much not harmonized text for marginal safety benefits. The differences between NPA and NPRM will force the applicants to adopt the more stringent requirement negating the benefit of the intended simplification. Therefore the EASA and FAA requirements as well as the guidance material shall be fully harmonized. The mutual acceptance of the guidance material shall be covered by the BASA/TIP with automatic mutual recognition. Failing to do so, will over the years, invalidate the effort of the harmonization and cause additional burden for the applicants. The requirements numbering system shall be the same between FAA and EASA. While the proposed reorganization can ease the certification effort for new and novel features, it must also be said, that the amount of possible means of compliance will not necessarily speed up the certification process. For initial certification it could be quite bothersome to agree with the applicant on an acceptable means of compliance. In the post certification process, e.g. changes, it is of unique importance that the certification team is in possession of the agreed certification basis of the initial certification. Other remark/question: For some time we have been using an IM/MoC CRI to address Oxygen Fire Hazard in Gaseous Oxygen Systems (RMT.0458 refers). Where will this IM/MoC be made available?
response	

comment	*194* comment by: *DAHER* The commentator understands the need of simplification of GA aircraft certification requirements and procedures. The commentator fully agrees with the objective of this NPA 2016-05.
response	

comment	*202* comment by: *Responsable de Navigabilité de NOGARO AVIATION* NOGARO AVIATION confirme le besoin de simplification des exigences et des procédures de certification pour les avions légers. NOGARO AVIATION est tout à fait d'accord avec l'objectif de cette NPA et soutient l'AESA dans cette demarche.
response	

comment	*203* comment by: *Responsable de Navigabilité de NOGARO AVIATION* Le règlement est impotant mais la procedure de certification l'est aussi. La procedure de certification des Avions Legers Européens n'existe pas encore, il est urgent que l'AESA la rédige et la publie. Avec la part 21 qui dispense d'agrément de conception et cette future règlemenation qui ne fixe que des objectifs de sécurité, cette procedure est encore plus necessaire.
response	

comment	*204* comment by: *Responsable de Navigabilité de NOGARO AVIATION* Le règlement mais aussi la procédure de certification et le portail informatique pour les postulants devraient être disponibles dans toutes les langues des pays membres de l'AESA.
response	

comment	*221* comment by: *AEROMOBIL* AEROMOBIL supports the need of simplification of GA aircraft certification requirements and procedures. AEROMOBIL fully agree with the objective of this NPA 2016-05.
response	

comment	*222* comment by: *AEROMOBIL* AEROMOBIL supports the need of simplification of GA aircraft certification requirements and this NPA 2016-05. The rule is very important but the certification procedure too. AEROMOBIL insists on the need to have a certification procedure. With this new rule allowing the Applicant to propose some AMCs, the need of a clear EASA certification procedure adapted to GA aircraft and small organization (which are allowed not to have neither DOA nor APDOA in some cases), is even more important.
response	

comment	*239* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **General comment** ELIXIR AIRCRAFT supports the need of simplification of GA aircraft certification requirements and procedures. ELIXIR AIRCRAFT fully agree with the objective of this NPA 2016-05.
response	

comment	*240* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **General comment** The rule is very important but the certification procedure too. ELIXIR AIRCRAFT insists on the need to have a certification procedure. With this new rule allowing the Applicant to propose some AMCs, the need of a clear EASA certification procedure adapted to GA aircraft and small organization (which are allowed not to have neither DOA nor APDOA in some cases), is even more important.
response	

comment	*257* comment by: *CAA CZ* We understand the intention and purpose of relocating the specific requirements from the CS-23 itself into the external "consensual" standards. However, in principle, we do not consider it contributing/effective to move the so far freely accessible AMC/GM content into chargeable documents and with reader access limited by licencing and similar limitations. Technological domains that achieved major development in the last decades (e.g. internet

	and IT in general) typically employed the opposite approach (making the content freely accessible, for example using public domain form of data distribution). Moving so far free AMC information into chargeable documents will not support expected scope and effectivity of its utilization.
response	

comment	*258* comment by: *CAA CZ* In case the external standards are really planned to be accessible only after payment, special and free of charge access conditions should be granted to NAAs and other government users.
response	

comment	*259* comment by: *CAA CZ* What form should have the proposal for new means of compliance submitted by an individual or an organisation? What will be the process of its review and approval? What will be the expected role of NAAs in this review/approval process and what process shall be followed by NAA?
response	

comment	*264* comment by: *General Aviation Manufacturers Association (GAMA)* Attachment #1 On behalf of IAOPA, ASD & GAMA (Please see attached letter): EASA's reorganisation of CS-23 is critical to securing the future of general aviation in Europe and allowing the European general aviation manufacturers to succeed globally. EASA's leadership in assuring close harmonisation with other key aviation authorities as the design requirements evolve has been well coordinated with the European aviation community over the past several years and the resulting NPA 2016-05 generally represents a proposal which allows for new safety enhancements and innovations to be incorporated in an efficient manner. Upon addressing the comments of the aviation community, it will be critical for EASA to quickly implement the proposed amendment in as short a timeframe as possible. The European general aviation community hopes to see the new CS-23 in place by the end of this year with reference to means of compliance through globally coordinated consensus standards. **General Comments:** The shift to a proportional and objective based rules within the CS-23 framework will provide general aviation with the ability to more efficiently design, certify, produce, operate and maintain the aeroplanes of today and it will assure the future of general aviation will only be limited by human imagination. Working with key states of design to assure close harmonisation of these new regulations is as important to the success of this process and the associations appreciate the EASA's leadership in this area. The EASA must make it a top priority to closely coordinate with aviation regulators at key states of design to assure that

the European general aviation industry can reach its full potential.

As EASA works so hard to halt the slow decline in general aviation activity, active pilots and the continual aging of the general aviation fleet, it is clear that the proposed changes are necessary to reverse these trends. While traditional rulemaking efforts have focused on specific technical regulations through myopic lenses, this proposed rule takes account of the entire general aviation ecosystem; it assures real world improvements can occur as opposed to other rulemaking activities which merely produce more documentation and administrative work. This revision of CS-23 represents a future direction of coordinated rulemaking that we hope will continue.

The proposals contained in NPA 2016-15 will allow for new products and retrofits to existing aeroplanes so that innovation which has previously been prevented by the nature of the existing requirements can be made available. The NPA has been crafted in a manner so as to allow the safe adoption of current and future technologies in an extremely efficient manner while assuring the highest levels of safety are maintained.

While the European aviation community has been heavily engaged in the development of globally valid design practices through ASTM F44, General Aviation Aircraft, it remains important that EASA recognise a range of means of compliance. It is of paramount importance that the objective level rules which have been developed are clearly implemented through detailed means of compliance which remain current and we appreciate EASA's commitment to assuring globally acceptable methods are developed properly. The model of following industry based consensus standards affords the possibility of solving what has been a very daunting problem in the past. Trying to contain high levels of detail in regulation is beneficial at a snapshot in time but practically the day those detailed rules are printed, they will no longer meet all the needs of a dynamic industry. The approach of objective based rules implemented through detained consensus standards, which are also globally harmonized, is the key to assuring the success of general aviation.

In order to assure that the proposed process is as successful as possible, EASA must dedicate time and effort to working with the NAAs and the EASA internal team to assure the application of these new requirements and the detailed methods of compliance that are accepted provide the efficiencies for both the EASA and the aviation community. With good faith execution of the proposed changes the aviation community can begin to realise new modifications and new aircraft that will grow safety and draw people into general aviation.

response

comment *320* comment by: *Transport Canada Civil Aviation Standards Branch*

"*Transport Canada has reviewed EASA NPA 2016-05 pertaining to the Reorganisation of CS-23. Several significant differences were noted against the recently published, and similar, Federal Aviation Administration (FAA) NPRM Revision of Airworthiness Standards for Normal, Utility, Acrobatic, and Commuter Category Airplanes.*

On September 25, 2014, the Directors of the Certification Services/Departments of the Federal Aviation Administration (FAA), European Aviation Safety Agency (EASA), Transport Canada Civil Aviation (TCCA) and the Agência Nacional de Aviação Civil (ANAC) met in Washington, D.C. and determined that because of the increased globalization of the aviation business there is a need for greater collaboration among the authorities to harmonise

regulatory systems in order to effectively respond to common industry issues. This led to a multilateral arrangement being created between the United States, the European Union, Canada and Brazil. A certification management team (CMT) governance structure was established between the four authorities to more efficiently and effectively develop and implement regulatory and policy solutions to common certification issues. One of the focus areas on the CMT roadmap is Certification Policy Alignment under which the CMT partners are to work closely to align certification policies to allow for the seamless transfer of aviation products and efficient oversight of the industry, and under which CMT partners are to engage each other to develop common principles and policy in support of new rulemaking efforts whenever possible.

EASA, which was a participant in the FAA initiated Part 23 Reorganization Aviation Rulemaking Committee (ARC), provides in the NPA that the present proposed rulemaking is based on the conclusions of the ARC, which it supported. Transport Canada also supports the conclusions of the ARC and believes that international harmonisation would be an important aspect in the proposed rulemaking. It is not clear that the current NPA is moving towards a harmonized set of performance-based design criteria between CS-23 and 14 CFR Part 23. It is anticipated that the CS-23 and 14 CFR Part 23 requirements would have as their means of compliance one or more sets of non-governmental organization consensus standards, such as those of ASTM F44. In this re-casting of CS-23 (and 14 CFR Part 23) to performance-based requirements, the opportunity for harmonization should be pursued, which would promote the efficient use of resources in the certification and validation of general aviation airplanes.

response

Notice of Proposed Amendment 2016-05 p. 1

comment *260* comment by: *CAA CZ*

This NPA has differences in certain paragraphs numbering as compared to the NPRM. From the practical point of view, coordinated numbering is essential for effective use of both FAA and EASA harmonised systems. We expect that the unification of numbering will be done in the final stage of the NPA processing.

response

EXECUTIVE SUMMARY p. 1

comment *58* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)*

After the creation of the *Light Sport Aircraft* by the FAA, the EASA has created the *European Light Aircraft* category (ELA). The commentor is surprised by the fact that the NPA 2016-05 does not mention at all the ELA although this NPA and the ELA creation have exactly the same goals. The FAA and the ARC have performed a good work but the EASA, the European industry and the European NAAs have also achieved a good work with the ELA rules.
The commenter recommends mentioning the ELA Category which is also used in Production, Maintenance and Flight Crew Licensing.

response

comment	*60* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **Question for stakeholders on page 13 on cost savings** Although the airspace and the General Aviation movements are very different, the commentor considers that a similar scale of costs savings could be achieved in Europe ad in the USA. The changes on the the stall and spins rules are the most important in that objective.
response	

comment	*256* comment by: *FAA* The FAA has reviewed EASA's proposed reorganization of CS-23 — Certification Specifications for Normal, Utility, Aerobatic, and Commuter Category Aeroplanes and enthusiastically concurs with the concept of this proposed amendment. As noted in the NPA, the FAA published an NPRM on March 14, 2016 that proposed a revision to 14 CFR 23 (Part 23) using the same concept to replace the current Part 23 requirements with objective, performance based requirements. The FAA received a significant number of public comments to the NPRM, and these have been evaluated and addressed where appropriate in the final rule language. A collective comment, repeated many times, emphasized the need to ensure the Part 23 revision is fully harmonized with the EASA CS-23 amendment. The FAA and EASA have closely cooperated throughout our parallel rulemaking efforts. Following publication of the final Part 23 rule, which is scheduled for December 2016, the FAA encourages a continuation of this cooperation to achieve a high level of harmonization between the revised Part 23 and amended CS-23. We concur harmonization of these amended regulations is vital to the global aviation industry and supports the success of General Aviation development and innovation.
response	

1. Procedural information p. 3-4

comment	*241* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **The rule development procedure** After the creation of the *Light Sport Aircraft* by the FAA, the EASA has created the *European Light Aircraft* category (ELA). ELIXIR AIRCRAFT is surprised by the fact that the NPA 2016-05 does not mention at all the ELA although this NPA and the ELA creation have exactly the same goals. The FAA and the ARC have performed a good work but the EASA, the European industry and the European NAAs have also achieved a good work with the ELA rules. The commenter recommends mentioning the ELA Category which is also used in Production, Maintenance and Flight Crew Licensing.
response	

2. Explanatory note — 2.1. Background issue analysis: the reason for the reorganisation of CS-23 p. 5-11

comment	*145* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* §2.1.4 - The standardised and harmonised work with the FAA is vital. EASA and the FAA should address unnecessary differences in regulatory requirements between CS-23 and Part 23. This NPA and the FAA NPRM should result in significant harmonisation to achieve significant savings for both European manufacturers exporting to the US and vice et versa. Detailed rationales about EASA/FAA harmonisation issues show too many cases where differences still exist between EASA and FAA. These issues jeopardize the success of this reorganisation and use of consensus standards.
response	

comment	*146* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* §2.1.2 - The new objective requirements are defined in such a way that they are not likely to evolve much in the future. Only the standards will. It will have an impact on the Part-21 certification procedures ; particularly to establish the certification basis for a major change/STC or used of later standards than those used for the initial certification. Guidances from EASA are necessary to explain how to deal with these new rules to avoid undue both for TC Holders and Authorities.
response	

comment	*147* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* §2.1.5 - DGAC France regrets that EASA widely used paying standards. It is obviously contrary to the French law. These documents should be provided for free for applicants and the authority. The costs for an applicant should be clearly stated by EASA.
response	

comment	*174* comment by: *Federal Office of Civil Aviation (FOCA), Switzerland* **2.1.5 Means of compliance** *Comment FOCA:* the approach is supported. However, to make it workable it is essential that these documents are made readily and easily available. It is proposed to publish them on a public website taking the FAA Regulatory and Guidance Library as reference.
response	

comment	*235* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **2.1.3 Consensus standards** VELICA commented on that point the A-NPA. The wording retained by the EASA is perfect and VELICA thanks EASA for having taking into account its comment : "any individual or organisation may develop their own proposed means of compliance that may be submitted to EASA for acceptance."
response	

comment	*262* comment by: *CAA CZ* 1. At the end of the paragraph 2.1.5 of the NPA Explanatory note it is written: „EASA proposes to continue to allow the use of the prescriptive means of compliance currently codified in CS-23 and CS-VLA as yet another alternative means of compliance with the proposed CS-23. This would not apply, however, to the proposed new requirements, such as CS 23.2130 (Controllability), 23.2145 (Stall characteristics, stall warning, and spins), and 23.2160 (Flight in icing conditions).“ Where can an applicant find this limited scope of e.g. AMC No 1 to CS-23? There is no limitation on AMC No 1 in section 6 (AMC to CS-23).
response	

comment	*306* comment by: *Garmin International* Suggest changing “LOC happens when an aeroplane enters a flight regime” to “… unintentionally enters …”
response	

2. Explanatory note — 2.3. Impact analysis	p. 11-14

comment	*22* comment by: *René Meier, Europe Air Sports* Question for stakeholders page 12/53 We think a similar scale of safety benefits will be achieved in the long run, most probably, however, not as quickly as we would like to get positive results, because cultural and regulatory differencies are not so easy to overcome. We explicitely think of different training processes, different approaches when regulations are prepared and enforced, of the in our view easier access to airspace and aerodromes for light aircraft in the United States. This all in one sentence: Because, most probably, European GA pilots fly less than US GA pilots, thus accumulating less flight experience.
response	

comment	*23* comment by: *René Meier, Europe Air Sports* Question for stakeholders page 13/53 Overall cost savings will result from applying the opportunities CS-23 / CS-VLA offer, we estimate this will happen in the lower double-digit percentage figures, with important variations countrywise in EASAland considering the heterogenous state of the economies of the member states and of the size and competence of their aviation industry.
response	

comment	*41* comment by: *UK CAA* **Page No:** 12 **Paragraph No:** Question for stakeholders - safety benefits **Comment:** It is noteworthy that this NPA's objective is "to maintain the level of safety provided by the current CS-23 and CS-VLA requirements." Consequently, any improvements in safety through use of new technologies and introduction of new safety –enhancing technologies is dependent on the response of industry, and an appropriate level of compliance oversight. It is also notable that in response to existing safety concerns the proposed requirements also include new enhanced standards for resistance to departure from controlled flight and for flight in icing conditions. These new requirements are significantly more prescriptive than the other requirements that have been developed in accordance with the new objective-based philosophy. Thus, it would seem that when there is a need to ensure a level of safety, the use of more traditional, prescriptive requirements are relied upon. It is suggested that this is an indication of the safety benefits to be had from more prescriptive requirements and that a better overall balance needs to be achieved in the final version of a reorganised CS-23. To achieve this more easily and cost effectively, it should be recognised that the wide range of applicability of CS-23 has been regarded as a difficulty in the development of the code. Thus, its continued application to 'single seat' (level 1) types, through to 'commuter' (level 4) types will continue to hamper and compromise the new requirements which could otherwise be tailored to the task if, for example, level 3 and 4 types were placed into a new 'CS-24'.
response	

comment	*42* comment by: *UK CAA* **Page No:** 13 **Paragraph No:** Question for stakeholders- cost savings **Comment:** The NPA states that the principle benefit to industry will be a cheaper certification process resulting from saving in EASA's rulemaking process. However, this needs to be offset against the increased costs to industry resulting from its participation in the development of industry standards, and the ongoing costs associated with the access to those standards that exist today (outside of this NPA period). The objective should be to facilitate an increase in the level of safety through use of innovative technologies with minimal or no increase in certification process costs.
response	

comment	*59* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **Question for stakeholders on page 12 on safety benefits** Although the airspace and the General Aviation movements are very different, the commentor considers that a similar scale of safety benefits could be achieved in Europe ad in

	the USA.
response	

comment	*148* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* §2.3.1 - Question for stakeholders : DGAC France agrees on the rationale provided but as concurs the scale of safety benefits which could be achieved in Europe, it seems very difficult to have a clear view of the benefits.
response	

comment	*149* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* §2.3.4 - Question for stakeholders : Although the General Aviation in Europe is more narrow than in the USA, DGAC France considers that a similar scale of costs savings could be achieved in Europe. Nevertheless, it seems also important that EASA facilitates and encourages approval of generic avionics STCs in Europe as FAA does.
response	

comment	*223* comment by: *AEROMOBIL* **Question for stakeholders on page 12 on safety benefits** Although the airspace and the General Aviation movements are very different, AEROMOBIL considers that a similar scale of safety benefits could be achieved in Europe ad in the USA.
response	

comment	*224* comment by: *AEROMOBIL* **Question for stakeholders on page 13 on cost savings** Although the airspace and the General Aviation movements are very different, AEROMOBIL considers that a similar scale of costs savings could be achieved in Europe ad in the USA. The changes on the the stall and spins rules are the most important in that objective.
response	

comment	*242* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Question for stakeholders on page 12 on safety benefits** Although the airspace and the General Aviation movements are very different, ELIXIR AIRCRAFT considers that a similar scale of safety benefits could be achieved in Europe ad in the USA.
response	

comment	*243* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Question for stakeholders on page 13 on cost savings** Although the airspace and the General Aviation movements are very different, ELIXIR

	AIRCRAFT considers that a similar scale of costs savings could be achieved in Europe ad in the USA. The changes on the the stall and spins rules are the most important in that objective.
response	

3. Detailed rationale for the proposed EASA/FAA harmonisation issues p. 15

comment	*200* comment by: *DAHER* The commentator is aware that the harmonisation is very difficult between both regulations, and appreciates that the differences are explained before each requirement.
response	

comment	*225* comment by: *AEROMOBIL* **Numbering** AEROMOBIL recommends that the CS-23 or FAR 23 numbering system is maintained. It is of a great help for the current design organisations and do not change anything for the newcomers. The fact that the numbering system is not harmonized and subject to changes is a undue administrative burden. We should use our resources and energy to work on any item having consequences on the safety level.
response	

comment	*226* comment by: *AEROMOBIL* **Numbering** AEROMOBIL recommends that the CS-23 or FAR 23 numbering systems are harmonized.
response	

comment	*244* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Numbering** ELIXIR AIRCRAFT recommends that the CS-23 or FAR 23 numbering system is maintained. It is of a great help for the current design organisations and do not change anything for the newcomers. The fact that the numbering system is not harmonized and subject to changes is a undue administrative burden. We should use our resources and energy to work on any item having consequences on the safety level.
response	

comment	*245* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Numbering** ELIXIR AIRCRAFT recommends that the CS-23 or FAR 23 are harmonized
response	

3. Detailed rationale for the proposed EASA/FAA harmonisation issues — 3.1. General harmonisation issues p. 15-16

comment	*6* comment by: *René Meier, Europe Air Sports* Page 15/53 3.1.1. Numbering We agree with your proposal to introduce an adapted numbering system. Rationale: The proposal is straight forward and clear, we did not ambiguities.
response	

comment	*7* comment by: *René Meier, Europe Air Sports* Page 16/53 3.1.2. Language The wording the Agency proposes is adapted to the needs this technical document used by quite different stakeholders.
response	

comment	*61* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **§ 3.1.1. Numbering** The commentor recommends that the CS-23 or FAR 23 numbering system is maintained. It is of a great help for the current design organisations and do not change anything for the newcomers. The fact that the numbering system is not harmonized and subject to changes is a undue administrative burden. We should use our resources and energy to work on any item having consequences on the safety level.
response	

comment	*62* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **§ 3.1.1. Numbering** The commentor recommends that the CS-23 or FAR 23 numbering system are harmonized.
response	

comment	*150* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* DGAC France has no objection to introduce a new numbering system. But it is vital that EASA develops a specific table to provide correlation and cross-reference information between the « old » CS-23 and the new one. This cross-reference table would be an important tool for applicants and the authority to ease the work. As already stated above, the standardised and harmonised work with the FAA is vital. It appears that the NPA and the NPRM have a different new numbering system. This is an

	important issue because until now, CS-23 and Part 23 have the same numbering system. The introduction of two new numbering system is unacceptable and will create additionnal undue burden. Therefore, EASA and the FAA should harmonize their new numbering system.
response	

comment	*201* comment by: *DAHER* The commentator recommends that the CS-23 or FAR 23 numbering system is maintained. It is of a great help for the current design organisations and do not change anything for the newcomers. The fact that the numbering system is not harmonized and subject to changes will add administrative burden and will be more confusing for users of regulations. We should use our resources and energy to work on any item having consequences on the safety level.
response	

comment	*205* comment by: *Responsable de Navigabilité de NOGARO AVIATION* NOGARO AVIATION recommande que soit conservée la numérotation actuelle des paragraphes.
response	

comment	*206* comment by: *Responsable de Navigabilité de NOGARO AVIATION* NOGARO AVIATION recommande la numérotation des règlements américain et européen soit harmonisée.
response	

5. Proposed CS-23 performance-based requirements p. 18

comment	*155* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* General comment on Subpart B - Flight : Previoulsy, CS-23 commuter must provide evidence of different minimum performances than with others categories. This NPA defines new high level performance requirement without differentiation between the certification levels. How the safety level for the Certification level 4 is achieved by deleting requirement about minimum performances ?
response	

comment	*265* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: As EASA moves the detail and prescriptiveness from CS to AMC it will remain important that applicants can anticipate that the common interpretations of CS-23 will remain in place going forward. It would be unacceptable for EASA to make project by project judgement calls

	whereby one previously accepted means of compliance is not accepted on a new project unless that previous means has been shown to be unsafe or inadequate in meeting the CS-23 plain reading of the language. In many areas of the CS-23 proposal, EASA uses words such as "likely" which could lead one to mean there is no fixed regulatory target. We believe EASA is specifying fixed regulatory targets but many of them depending on the combination of product complexity, performance and risk. We seek clarity in this area.
response	

CS-23 — SUBPART A — GENERAL — CS-23.2000 Definitions p. 18

comment	*2* comment by: *Prof. Filippo Tomasello* An aeroplane with 0 passengers on board, may have the pilot on board or not. In the former case, CS-23 is obviously applicable to the aeroplane. In the second case, the aircraft is unmanned and CS-23 shall not apply (in the future EASA may issue CS-UAS). The distinction between manned and manned is not based on the presence of passengers on board, but on the presence of the pilot. It is understood that the intent of FA and EASA is to apply FAR/CS-23 to manned aircraft, but this could be made more explicit. ICAO Annex 2 defines "Remotely piloted aircraft (RPA). An unmanned aircraft which is piloted from a remote pilot station." There is no definion of UAS in any Annex to the Chiacago Convention and not even in the ICAO RPAS Manual Doc 10109 (1st edition; 2015). However there is a term in ICAO Circular 328: "Unmanned aircraft. An aircraft which is intended to operate with no pilot on board." A very similar definition is proposed by the European Commission in the new EASA Basic Regulation (Article 3.29 in COM (2015) 613): 'unmanned aircraft' means any aircraft operated or designed to be operated without a pilot on board. It is considered not necessary to introduce a definition for RPAS or UAS in CS-23, since such aeroplanes are out of its scope. But, to make clear the difference in scope, a new definition is proposed for insertion in CS-23.2000: 'manned aeroplane' means any aeroplane operated or designed to be operated by at least one pilot on board.
response	

comment	*63* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **CS23.2000 Definitions** The commentor supports the fact that those definitions appear at the beginning of the rule. A lot of Authorities have a Part 25 culture and do not have the culture of GA aircraft where stall and engine failure are part of the flight domain.
response	

comment	*74* comment by: *Textron Aviation* **CS-23.2000 Definitions**

Definition of continued safe flight and landing could be interpreted as not being met by the engine failure of a single engine aircraft. With this interpretation, many of these rules cannot be met with a single engine.

Clarify definition to allow for engine failure on a single engine aircraft.

response

comment *122* comment by: *Embraer S.A.*

Embraer does not agree with definition of *designated fire zone* presented in the CS-23.2000 (b) since the definition proposed seems prescriptive and, therefore, against the spirit of the proposed NPRM FAA 14 CFR Part 23 rule.
Also, Embraer understands that definition of "*fire zone*", based on what is proposed in the draft of FAA AC 25.863-1, would be more appropriate.
Embraer also understands that current CS-23.1181, defines the "*hot*" parts of an engine installation as an ignition source and considering that there are fuel, oil and hydraulic fluids being carried around such areas, they shall be considered a fire zone and then the term "*designated*" would apply, which means that it is not necessary further analysis to define if it is a flammable fluids zone or a fire zone.

Embraer suggests to EASA to adopt the "*fire zone*" definition, in section CS-23.2000, as per draft of FAA AC 25.863-1 as follows:

CS-23.2000 Definitions

For the purposes of this part, the following definitions apply:

(b) ~~Designated~~ *Fire zone* means a zone that contains a nominal ignition source and may be exposed to flammable fluid/material as a result of a failure ~~where catastrophic consequences from fire in that zone must be mitigated by preventing the spread of the fire to other parts of the aeroplane~~.

response

comment *175* comment by: *Federal Office of Civil Aviation (FOCA), Switzerland*

Comment FOCA: The definition of the empty weight has long been seen as a missing element. This element is relevant, particularly for very light aircraft which may have a relatively low MTOM and high empty weight (particularly those with lots of advanced equipment). The result is a limited payload and the risk that aircraft are flown with an excessive TOM since, respecting the MTOM limitation, would lead to a considerable operational limitation (e.g. limited amount of fuel). In this respect the definition of empty weight can have a contribution to safety and is supported.

EASA remark about future technological developments is valid and we strongly support any measure meant at enabling and facilitating the introduction of electric and hybrid propulsion systems. It is our position that this should not lead to a not harmonized position. On the contrary, the new proposed regulation should encompass both arguments. For example the definition of "empty weight" could be:

	Empty weight means the weight of the airplane with fixed ballast, unusable fuel, components of the energy storage devices as per CS-23.2440 (e.g. batteries), full operating fluids, and other fluids required for normal operation of airplane systems.
response	

comment	*207* comment by: *Responsable de Navigabilité de NOGARO AVIATION* NOGARO AVIATION approuve la présence des definitions au début du document. Cela rappelle que le niveau de sécurité en aviation générale est inférieur à celui des avions lourds.
response	

comment	*227* comment by: *AEROMOBIL* **Definitions** AEROMOBIL supports the fact that those definitions appear at the beginning of the rule. A lot of Authorities have a Part 25 culture and do not have the culture of GA aircraft where stall and engine failure are part of the flight domain.
response	

comment	*246* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Definitions** ELIXIR AIRCRAFT supports the fact that those definitions appear at the beginning of the rule. A lot of Authorities have a Part 25 culture and do not have the culture of GA aircraft where stall and engine failure are part of the flight domain.
response	

comment	*266* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: It would be helpful to indicate that continued safe flight and landing may include a dead-stick glide to a safe landing or the use of an airframe parachute provided adequate crashworthiness exists and it may not be necessary to indicate that "some" damage may occur. It would be better to simply indicate "damage may occur".
response	

comment	*307* comment by: *Garmin International* Why is aircraft damage relevant to the definition of continued safe flight and landing? With increased focus on crashworthiness, if the aeroplane is a total loss but everyone inside is alive, is it really catastrophic? Shouldn't the door be left open to taking credit for future crashworthiness improvements? Damage to the aeroplane is a commercial consideration. It is entirely possible that someone in the future could develop some crashworthy design that saves lives by intentionally damaging the aeroplane under crash landings similar to a car's crumple zone. Why wouldn't an applicant get credit for that? Suggest removing "Upon landing, some aeroplane damage may occur as a result of a failure

	condition.”
response	

CS-23 — SUBPART A — GENERAL — CS-23.2005 Certification of normal category aeroplanes p. 18-19

comment	*3* comment by: *Prof. Filippo Tomasello* To make the scope of CS-23 clearer, it is proposed to modify the text of CS-23.2005(a): Certification in the normal category applies to **manned** aeroplanes ....
response	

comment	*8* comment by: *René Meier, Europe Air Sports* Page 18/53 CS-23.2005 (b) Question as regards "Level 3" and "Level 4" aeroplanes: If a such an aircraft is "single crew" certified may e.g. a 10th or a 20th passenger occupy the empty flightdeck seat? Page 19/53 CS-23.2005 (e) We propose to delete the comma between "...manoeuvers without limitations, other than..." Rationale: Making an uninterrupted statement enhances understanding the content of the text.
response	

comment	*64* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **CS23.2005 Certification of normal category aeroplane** The commentor supports the new categories and the EASA choices. “Simple” cannot be defined in such rule.
response	

comment	*65* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **CS23.2005 Certification of normal category aeroplane** The commentor is surprised by the fact that the EASA wrote that the NPA 2016-05 does not include the CS-LSA aircraft. It seems unconsistent with the EASA objectives. This paragraph does not prohibit a CS-LSA aeroplane manufacturer to apply for a CS-23 Type certification. As a consequence, CS-LSA aeroplanes are included in this rule. The commenter recommends including formally the CS-LSA aeroplanes in the future rule.
response	

comment	*76* comment by: *Textron Aviation* **CS-23.2005 Certification of normal category aeroplanes** With the exception of the MTOW of 19,000 lb, most arbitrary weights and boundaries have been removed from the proposed certification specifications. Maintaining the applicability of CS-23 to a MTOW of 8,618 kg (19,000 lb) does not meet the objective of replacing the current weight and propulsion divisions in small airplane specifications with performance and risk-based divisions. The recommendation is to replace the current CS-23 limit of 8,618 kg (19,000 lb) MTOW with a 2,721 kg (6,000 lb) Max Payload limit. Doing so would provide the following benefits – 1. Remove another arbitrary weight boundary from CS- 23. 2. Align the CS-23 rules more closely with the operational requirements found in FAR Part 121 and 125 and their EASA equivalent. Note: Part 121 already requires the aircraft to be certified to Part 25. Part 125 operations require the aircraft have a seating capacity of 20 or more passengers and have a max payload exceeding 6,000 lb. 3. Expanding the applicability of CS-23 would have a dramatic positive impact on the financial impact of such a change. Changing applicability from a MTOW to a Max Payload limit would not reduce safety due to the following – 1. The primary focus of the new specifications is on “performance and risk based divisions”. The proposal does not increase the maximum number of passengers that a CS-23 aircraft can carry; therefore there is no additional risk to the passengers onboard from the proposal. 2. CS-23 airplanes certified today for operations with up to 19 passengers have max payload capabilities well in excess of 1,814 kg (4,000 lb). Therefore the proposed payload limit of 2,721 kg (6,000 lb) has no substantial additional effect on performance or risk to passengers, or to people on the ground. **CS-23.2005 Certification of normal category aeroplanes** We agree with basing certification levels on the number of passengers, however the proposal is ambiguous for aeroplanes that may require 1 or 2 crew depending on operating rules. A second crew seat may or may not be occupied by a passenger depending on the qualifications of the pilot(s) and the operating rules under which a flight is being made. Change CS-23.2005 Certification of normal category aeroplanes to: (a) Certification in the normal category applies to aeroplanes with a passenger-seating configuration of 19 or less and a maximum certificated takeoff mass of 8 618 kg (19,000 pounds) or less. A passenger seat does not provide access to flight controls. (b) Aeroplane certification levels are: (1) Level 1 – for aeroplanes with a maximum seating configuration of 1 or 2 occupants. (2) Level 2 – for aeroplanes with a maximum seating configuration of more than 2 occupants and with a maximum configuration of up to 6 passenger seats. (3) Level 3 – for aeroplanes with a maximum configuration of 7 to 9 passenger seats. (4) Level 4 – for aeroplanes with a maximum configuration of 10 to 19 passenger seats.
response	

comment	*176* comment by: *Federal Office of Civil Aviation (FOCA), Switzerland* *Comment FOCA*: It is considered that the identification of 4 certification levels and specifically those proposed in the NPA is not in line with the overall intent of a simplified and streamlined approach. **Proposal:** As far as the categorization in terms of pax. Number is concerned, the following is proposed: 1 to 4: we cover the large majority of existing -and likely future- GA recreational aircraft. Need to identify specific alleviations for say a 1-seat aircraft can be defined at AMC level. 5 to 9: the number of occupants is still small but the aircraft can reach a higher level of technical and operational complexity. 10 to 19: in terms of social acceptance of risks a relatively high number of occupants and, in many cases, a high level of technical and operational complexity The low/high performance level approach is supported. However, it is proposed not to limit performance assessment to a speed criteria and to additionally consider the technical and operational complexities that are associated with high altitude operations (aircraft systems complexity, much higher complexity of abnormal und emergency procedures, navigation complexity).
response	

comment	*228* comment by: *AEROMOBIL* **Certification of normal category aeroplane** AEROMOBIL supports the new categories and the EASA choices. “Simple” cannot be defined in such rule.
response	

comment	*247* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Certification of normal category aeroplane** ELIXIR AIRCRAFT supports the new categories and the EASA choices. “Simple” cannot be defined in such rule.
response	

comment	*248* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Certification of normal category aeroplane (2)** ELIXIR AIRCRAFT is surprised by the fact that the EASA wrote that the NPA 2016-05 does not include the CS-LSA aircraft. It seems unconsistent with the EASA objectives. This paragraph does not prohibit a CS-LSA aeroplane manufacturer to apply for a CS-23 Type certification. As a consequence, CS-LSA aeroplanes are included in this rule. The commenter recommends including formally the CS-LSA aeroplanes in the future rule.

response

comment *318* comment by: *Garmin International*

See CS 23.2005(b):

It should be clarified that the number of passengers stated for each certification level is in addition to the pilot.

response

CS-23 — SUBPART B — FLIGHT — CS-23.2100 Mass and centre of gravity p. 19

comment *209* comment by: *DAHER*

b) The commentator agrees that the text is more precise than the FAA wording but we need more information about the acceptable precision level defined by the authority according to the aircraft type.

response

comment *267* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA:
CS-23.2100(b) - Additional clarity with respect to the necessary combination and levels of precision must be available in the referenced guidance material. We recommend that the EASA work to assure these globally accepted consensus materials include precise guidance in this area.

response

CS-23 — SUBPART B — FLIGHT — CS-23.2105 Performance data p. 19-20

comment *151* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

23.2105(b)(2): The possibility to develop data only up to the maximum ambient atmospheric temperature at which compliance with cooling requirements is shown was only applicable for aircraft with MTOM above 6000lbs.
DGAC France supports the extension of this possibility to all CS-23 aircraft.

response

comment *321* comment by: *Pedro Di Donagto*

Regarding letter (c), risk associated to an accelerate and stop condition is more linked to takeoff speeds and breaking capability than to VMO/MMO which is the criteria proposed. If the criteria is maintained, I suggest to let it clear in the discussion that, for example, a class III light jet restricted to VMO/MMO of 250/0.6, but with the takeoff speeds similar to other jets with higher VMO/MMO will also require special conditions.

response

CS-23 — SUBPART B — FLIGHT — CS-23.2110 Stall speed p. 20

comment *152* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

"...under the most adverse normal conditions for the configuration." "most adverse normal conditions" wording is problematic.
It should be clarified if it is atmospheric conditions, aircraft technical conditions or its configuration.

response

comment *153* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

At the end of this paragraph, the NPA replaces NPRM « for each flight configuration with power set at idle or zero thrust. » wording by « for the configuration ».
It is stated that the EASA proposal is consistent with the NPRM but DGAC France does not agree with this cancellation.
Could EASA provide the rationale to consider that the NPA is consistent with this change ?

response

CS-23 — SUBPART B — FLIGHT — CS-23.2115 Take-off performance p. 20

comment *43* comment by: *UK CAA*

Page No: 20

Paragraph No: CS-23.2115 Take-off performance

Comment: CS.23.2115 does not refer to runway type or runway surface condition, yet levels 1 and 2 aeroplanes sometimes operate from grass runways.. Reference to the type of runway surface needs to be added; see proposed text. For runway surface conditions, see comment on CS-23.2625.

Proposed Text: In CS-23.2115, add:-

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

(4) the effect on these distances of operation on other types of surface (e.g. grass, gravel) when dry, may be determined or derived and these surfaces listed in accordance with CS 23.2625(a)(2).

response

comment *44* comment by: *UK CAA*

Page No: 20

Paragraph No: CS-23.2115 Take-off performance

Comment: CS-23.59(a)(2) and (b)(2) specified a factor of 115% on the all-engines-operating take-off run and take-off distance, but this is not covered in the proposed CS-23.2115. The Class A performance operating rules do not specify any factors of their own in this respect so this needs to be covered at certification by CS-23.

Proposed Text: Include the factors of CS-23.59.

response

comment *75* comment by: *Textron Aviation*

CS-23.2115 Take-off performance
CS-23.2120 Climb Performance

Proposed 23.2115 and 23.2120 apply discriminators based on detailed quantitative climb criteria are in conflict with the stated intent of the rulemaking to develop standards that reflect the diversity of future airplane designs. In addition, the proposed rules are not consistent with current CS-23 and would require changes in how takeoff performance is determined that are not supported by the stated intent of the new objective requirement and are unwarranted. We provided specific comments addressing these concerns below.

Our other comments on the specifics of the proposed language notwithstanding, we recommend adoption of language similar to that proposed in the A-NPA that leaves determination of detailed standards appropriate to aeroplanes with different certification and performance levels to the means of compliance standards.

Adopt language similar to A-NPA 2015-06.

CS-23.2115 Take-off performance

The proposed requirements would result in an unwarranted change in methodology for determination of takeoff distances for commuter category airplanes. The use of 11 m (35 ft) above the takeoff surface as the standard for takeoff distance for commuter category aeroplanes has been in place for decades. The 11 m (35 ft) standard has been demonstrated in service as safe for the classes of airplane to which it has been applied.

CS 23.2115 Take-off performance.
(b) For single engine aeroplanes and levels 1, 2, and 3 lowspeed multiengine ~~all~~ aeroplanes, take-off performance includes the determination of ground roll and initial climb distance to 15 meters (50 feet) above the take-off surface.
(c) For levels 1, 2, and 3 high-speed multiengine
airplanes and level 4 multiengine airplanes, takeoff performance includes a determination of the following distances after the sudden critical loss of thrust:
(1) Accelerate-stop;
(2) Ground roll and initial climb to 11 meters (35 feet)
above the takeoff surface; and
(3) Net takeoff flight path.

response

comment *125* comment by: *Embraer S.A.*

Several existing light jets have been approved with certification bases that included some previous amendment of CS-23 plus an assortment of Special Conditions derived from CS-25. By these special conditions, the screen height on takeoff has been defined as 35 ft, instead of 50 ft as in the newly proposed section CS-23.2115. Hence, if these existing light jets undergo an upgrade or modification process, Embraer fears that the very basic regulatory definition of takeoff distance could be changed as well, with potentially high losses (need to prepare a new Performance Section for the AFM, diminishing approved performance, etc.) for both applicants and operators.

Therefore, Embraer understands that some kind of special considerations should be applied to such designs. For instance, a freezing of their certification bases should not be neglected.

response

comment *154* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

The CS-23.61 "takeoff flight path" requirement applicable to the commuter category is no longer considered. It is however a performance based requirement particularly with respect to minimum performance required at some airports.
DGAC France considers that the CS-23.61 “takeoff flight path” performance based requirement should be added for Level 3 High Speed planes and all Level 4.
DGAC France suggets the add of the following paragraph :
"(b)(3) for high-speed aeroplanes of level-3 and for all level-4 aeroplanes, take-off flight path."

response

comment *268* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: The proposed changes would impose a new requirement upon high-speed multi-engine aircraft if it were to require performance demonstration at 15 meters in place of the current requirement of 11 meters. There is no evidence to suggest that this change need occur so we request that the 11 meter height continue to apply to high-speed multi-engine aircraft and all level 4 aircraft.

response

CS-23 — SUBPART B — FLIGHT — CS-23.2120 Climb performance p. 21

comment *45* comment by: *UK CAA*

Page No: 21

Paragraph No: CS-23.2120 Climb performance.

Comment: EASA-Ops CAT.POL.A.305 and CAT.POL.A.325 require compliance with WAT limitations and assumes the availability of this information in the AFMs. CS-23 was deficient in requiring this information for aeroplanes below 2730kg. It Is understood that this was because the authors of JAR-23 assumed that the WAT limits applicable to aeroplanes over 2730kg would be applied by the operating rules to aeroplanes below 2730kg.

Justification: The purpose of WAT limits is to ensure that the aeroplane has acceptable minimum climb or acceleration capability to a reasonable height above the take-off and landing aerodrome. There are many aeroplanes on the EU register which do not have this information available and cannot comply with EASA-Ops. This anomaly needs to be corrected in CS-23.

response

comment *46* comment by: *UK CAA*

Page No: 21

Paragraph No: CS-23.2120 Climb performance.

Comment: Although the gradients from CS-23 have been retained in this reorganisation, the configurations and speeds to be used in their determination have not, but these are equally important and need to be specified too.

Proposed Text: The existing criteria from CS-23 Amdt. 4 should be included.

response

comment *77* comment by: *Textron Aviation*

CS-23.2120 Climb performance

A common terminology should be used, favoring the unambiguous “take-off configuration” over the undefined “initial climb configuration”.

CS-23.2120(a)(1) read --
“*With all engines operating and in the take-off configuration …*”
Let § 23.120(a)(1)(ii) read --
“*For levels 1 and 2 high-speed aeroplanes and all level 3 airplanes, a climb gradient ~~at takeoff~~ of 4 percent.*”

CS-23.2120 Climb performance

“Sea level” in CS 23-2120(a)(1)(i) is redundant with CS-23.2105(a)(1).

Let CS-23.2120(a)(1) read --
“*For levels 1 and 2 low speed airplanes, a climb gradient ~~at sea level~~ of 8.3 percent for landplanes and 6.7 percent for seaplanes and amphibians; and …*”.

CS-23.2120 Climb performance

The concept of “single engine crashworthiness requirements“ is not defined anywhere. Please clarify what crashworthiness requirements to which this language refers.

CS-23.2120 Climb performance

Change configuration to configuration(s) as one airplane might have multiple takeoff and approach configurations.

To obtain the best takeoff performance in high and hot conditions, it can be advantageous to use lesser flap settings to improve climb capability after takeoff. Climb requirements defined only in terms of the approach configuration effectively eliminate this capability, and do not reflect the current standards. CS-23.2120(a)(2)(iii) for multiengine level 3 high speed airplanes and level 4 airplanes should be changed to determine the climb gradients for weight, altitude temperature combinations appropriate for takeoff in the takeoff configuration.

Let CS-23.2120(a)(2)(ii) read --
“*For levels 1 and 2 high-speed aeroplanes, and level 3 lowspeed airplanes, a 1 percent climb gradient at 122 meters (400 feet) above the takeoff surface with the landing gear retracted and flaps in the takeoff configuration(s);*”
Let CS-23.2120(a)(2)(iii) read --
“*For level 3 high-speed airplanes and all level 4 airplanes, a 2 percent climb gradient at 122 meters (400 feet) above the takeoff surface with the landing gear retracted and flaps in the ~~approach~~ take-off configuration(s).”*

response

comment *156* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

23.2120(a)(2)(i): The "crashworthiness requirement" must be defined in the CS-23

response

comment *157* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

23.2120 (b) (2) et (3) : Performance expected « following a critical loss of thrust on take-off or during the en-route phase of flight » should be clarified for single engine.
Is it glide performance ?

response

comment *158* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

23.2120 (a)(3) : The "climb gradient during balked landing" requirement is now 3% for all Certification Levels.
Previously, this climb gradient was 2.5% for aircraft with a MTOM above 6000lbs (except commuter)(refer to CS-23.77 (b)).
Could EASA explain why it is more strict for Certification Levels 3 and 4?

response	

comment	*195* comment by: *CAA-NL* CS-23.2120(a)(2): multi-engine aeroplanes, after a critical loss of thrust: requirements seem to be missing for level 1 and 2 low-speed aeroplanes that **do** meet the single engine crashworthiness requirements.
response	

comment	*269* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of GAMA & ASD: CS-23.2120(a)(2)(i) Climb performance - We believe that ISA temperature should be added to this section or the term density altitude should replace the term pressure altitude.
response	

comment	*270* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: The concept of single engine crashworthiness is not clearly defined. We suggest EASA discuss appropriate level of crashworthiness or better define single engine crashworthiness.
response	

comment	*271* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: CS-23.2120(a)(2)(iii) - Requiring this demonstration of climb performance in the approach configuration may be unjustly burdensome. We suggest EASA continue to allow demonstration of this climb in the take-off configuration with gear up.
response	

comment	*308* comment by: *Garmin International* Garmin believes “at ISA temperature” should be added to clarify the conditions at which the rule must be met. Suggest changing to: “(i) For levels 1 and 2 low-speed aeroplanes that do not meet single engine crashworthiness requirements, a 1.5 percent climb gradient at a pressure altitude of 1 524 m (5 000 ft) at ISA temperature in the cruise configuration;” Alternatively, “pressure altitude” could be changed to “density altitude”.
response	

CS-23 — SUBPART B — FLIGHT — CS-23.2125 Landing performance p. 22

comment	*47* comment by: *UK CAA* **Page No:** 22 **Paragraph No:** CS-23.2125 Landing performance **Comment:** The landing speeds to be used in the determination of landing distances need to be specified. These need to be defined in terms of margins above the stall speed, as is the case in CS-23 Amdt. 4. **Proposed Text:** The existing text and criteria from CS-23 Amdt.4 should be included.
response	

comment	*48* comment by: *UK CAA* **Page No:** 22 **Paragraph No:** CS-23.2125 Landing performance **Comment:** CS.23.2125 does not refer to runway type or runway surface condition, yet levels 1 and 2 aeroplanes sometimes operate from grass runways, and level 4 types may encounter contaminated conditions particularly in commercial operations. Reference to the type of runway surface needs to be added; see proposed text. For runway surface conditions, see comment on CS-23.2625, **Proposed Text:** In CS-23.2125, add:- The applicant must determine, for standard temperatures at weights and altitudes within the operational limits: (a) The landing distance, starting from a height of 15 m (50 ft) above the landing surface, required to land and come to a stop. **The effect on these distances of operation on other types of surface (e.g. grass, gravel) when dry, may be determined or derived and these surfaces listed in accordance with CS 23.2625(a)(2).**
response	

CS-23 — SUBPART B — FLIGHT — CS-23.2130 Controllability p. 22

comment	*139* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* It is highly supported that (a)(3) is worded as a general term to allow different design solutions defined in an AMC.
response	

comment	*159* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* 23.2130 (b) : Is really the aeroplane making a safe landing by itself ? We are also wondering if

	the use of "approach angle of attack" is really helping to clarify the "below Vref" condition. DGAC France suggests the following alternative wording: "The aeroplane characteristics must allow adequate control when following landing procedures, with a safe margin below Vref."
response	

comment	*177* comment by: *Federal Office of Civil Aviation (FOCA), Switzerland* *Questions FOCA:* Would VTOLs be considered in CS-23? Does it justify non-harmonization?
response	

comment	*196* comment by: *CAA-NL* CS-23.2130: FAA NPRM 23.200(c) requires that "For levels 1 and 2 multiengine airplanes that cannot climb after a critical loss of thrust, V_{MC} must not exceed V_{S1} or V_{S0} for all practical weights and configurations within the operating envelope of the airplane". We do not agree that this is covered by the proposed CS-23.2130 (a)(3), which requires (among others) that the aeroplane be controllable and manoeuvrable with any likely propulsion failure. To reduce the number of LOC events, the explicit requirement in the NPRM is in our opinion necessary and should not be hidden in the AMC, even though we recognize there is guidance on this subject in ASTM F3173/F3173M par. 4.5.
response	

comment	*272* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: It may be more appropriate to clarify that 23.2130(a)(1) applies during normal phases of flight and (2) applies during low-speed and stalls.
response	

comment	*309* comment by: *Garmin International* 23.2130(a)(2) only says that the aeroplane must have controllable stall characteristics during low speed operations. There is no mention of flight characteristics related to control usage at the stall that does not precisely and correctly control the stall. An applicant can comply with the rule and have an aeroplane that is controllable through a stall if flown correctly, but if not flown correctly can enter an uncontrollable spin if the aeroplane is allowed to stall while not precisely coordinated. While we do not have a specific suggestion, we suggest changing 23.200(a)(2) to address this concern.
response	

CS-23 — SUBPART B — FLIGHT — CS-23.2145 Stall characteristics, stall warning, and spins p. 23-24

comment	*66* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **CS 23.2145 Stall charcteristics, stall warning and spins (a)** The commentor fully support the new approach focusing on the last turn stall characteristics.
response	

comment	*67* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **CS 23.2145 Stall charcteristics, stall warning and spins (a)** The aeroplane certified for aerobatics should be exempted of stall warning.
response	

comment	*79* comment by: *Textron Aviation* **CS-23.2145 Stall characteristics, stall warning, and spins** CS-23.221, as well as the Part 23 Re-write ARC final proposal, does not require a demonstration that multiengine airplanes do not have a tendency to inadvertently depart controlled flight. However this NPA does, which represents a significant burden increase with no apparent safety justification. In fact, LOC accidents on "light" multiengine airplanes result mostly from pilots failing to maintain directional control following an engine failure, rather than uncontrollable post-stall characteristics with AEO. Existing higher performance multiengine airplanes, including light jets, that would be classified as level 2 per proposed CS-23.5 have not demonstrated a record of LOC accidents. We suggest retaining the existing applicability of 23.221 with respect to departure demonstrations. Another suggested alternative is to not specify certification levels or other design characteristics in the rule but rather adopt language proposed in the A-NPA and leave the option of defining different, but appropriate, criteria for airplanes of varying certification levels to the means of compliance standards. Let CS-23.2145(b) read -- "(b) ~~*Levels 1 and 2 airplanes and level 3*~~ *Single engine aeroplanes, not certified for aerobatics, must*"
response	

comment	*140* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* (b) It is supported to leave multiple paths to address the safety objective.
response	

comment	*160* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* General comment on 23.2145 : No requirement is applicable to Certification Levels 1 and 2 multiengine aircraft. EASA should develop stall characteristics and stall warning requirements for the Certification Levels 1 and 2 multiengine aircraft.

response	

comment	*161* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* 23.2145 (a) : Stall warning exemption is common for Aerobatic airplanes. In order to avoid undue burden to issue an exemption for each aerobatic aircraft, the 23.2145(a) should exclude aeroplanes intended for aerobatics.
response	

comment	*208* comment by: *Responsable de Navigabilité de NOGARO AVIATION* NOGARO AVIATION soutient cette approche qui vise à traiter du cas le plus dangereux, le décrochage en dernier virage.
response	

comment	*229* comment by: *AEROMOBIL* **CS 23.2145 Stall charcteristics, stall warning and spins** AEROMOBIL fully support the new approach focusing on the last turn stall characteristics.
response	

comment	*249* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Stall charcteristics, stall warning and spins (a)** ELIXIR AIRCRAFT fully support the new approach focusing on the last turn stall characteristics.
response	

comment	*250* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Stall charcteristics, stall warning and spins (a)** The aeroplane certified for aerobatics should be exempted of stall warning.
response	

comment	*273* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: This proposal would impose loss of control prevention upon larger multi-engine aircraft which have not historically demonstrated a weakness in this area. At a minimum EASA must consider the alleviations necessary for compliance to be less stringent at this level with consideration given for type ratings, available power, etc.
response	

comment	*300* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

	The NPA introduces new requirements to reduce inadvertent stall-related departures from controlled flight and would also include new enhanced standards. DGAC France fully supports this approach and the objective of these new safety requirements. Nevertheless, during pilot training, the depart controlled flight should be possible to assure the intended level of training as defined within Part FCL (and related work on UPRT). To achieve this objective, benign behaviour when departing controlled flight (CS-23.2145 (b)(2)) must be demonstrated as well as the return to controlled flight. Given the case a system preventing departure from controlled flight (CS-23.2145 (b)(3)) is designed, the most adverse failure conditions should demonstrate benign depart and return controlled flight. Therefore, DGAC France considers that the current CS23 requirements applicable to the Normal category aeroplane shall be kept and that do not negate the safety gain expected from this rulemaking action.
response	

CS-23 — SUBPART B — FLIGHT — CS-23.2155 Vibration, buffeting, and high-speed characteristics p. 24-25

comment	*80* comment by: *Textron Aviation* **CS-23.2155 Vibration, buffeting, and high speed characteristics** Current CS-23.251(a) requires that buffeting in any normal flight condition should not be severe enough to cause "excessive fatigue" but the proposed CS-23.2155 omits the word "excessive." Without the qualifier, any perceptible level of fatigue could be construed as unacceptable. The proposal would result in an unwarranted change in standards for vibration. Let CS-23.2155(a) read -- *"Vibration and buffeting, for operations up to VD/MD,* *must not interfere with the control of the aeroplane or cause excessive fatigue to the flightcrew. Stall warning buffet within these limits is allowable."*
response	

comment	*274* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: We believe that it would be more appropriate to distinguish that "excessive" fatigue must be prevented as fatigue is a general consequence of operating most aircraft for long-durations.
response	

CS-23 — SUBPART B — FLIGHT — CS-23.2165 Flight in icing conditions p. 25

comment	*81* comment by: *Textron Aviation* **CS-23.2165(a)(2) Flight in icing conditions**

This appears to be a very difficult and complex requirement as most autopilots on Part 23 aircraft are simple enough that they will allow the airplane to stall in vertical modes in normal weather conditions.

Recommend adding an allowance to prohibit use of autopilot vertical modes or disabling the use of autopilot vertical modes when ice protection systems are turned on as an acceptable means of meeting the requirement.

response

comment *178* comment by: *Federal Office of Civil Aviation (FOCA), Switzerland*

Comment FOCA: The proposed text (same as in the NPRM) limits the demonstration of compliance in natural icing flight tests to the case
(2) The aeroplane is protected from stalling when the autopilot is operating in a vertical mode.

The NPRM further explains that:
The vertical mode is a prescriptive requirement to limit the applicability. Simple autopilots such as a wing leveler would not be affected by this requirement. Numerous icing accidents have shown that unrecognized airspeed loss can occur with autopilots in altitude hold mode or vertical speed mode. Demonstration, as a means of compliance, may include design and/or analysis and does not mean natural icing flight tests are required.

The intent of limiting the applicability is understood and it is agreed that the vertical mode must be considered. However, it is considered more appropriate to formulate the requirement in a different way and to avoid being prescriptive with respect to the autopilot (AP) modes. This takes also in consideration the possible introduction of future technologies that may bring new AP modes.
The following options are proposed:

Option 1:
(2) The airplane is protected from stalling when the autopilot is engaged.

The GM/AMC (e.g an ASTM Standard) would then specify that:
- This requirement does not apply to AP without pitch authority.
- As a minimum the demonstration of compliance will include the case of the autopilot operating in a vertical mode. For other AP modes, demonstration, as a means of compliance, may include design and/or analysis and may not necessarily mean that flight tests in natural icing conditions are required.

Option 2:
(2) The airplane is protected from stalling when the autopilot is engaged. This requirement does not apply to AP without pitch authority.

It is recommended to verify the contents of Standard ASTM F3120/F3120M-15 Standard Specification for Ice Protection for General Aviation Aircraft, specifically regarding the requirements for:
- Airframe Ice Protection System performance above 30,000 feet.
- High performance airplanes flight instrument external probes – Qualification in Icing Conditions

	In one recent project EASA issued CRIs for these topics that were not completely aligned with the corresponding FAA IPs. Harmonization shall be achieved.
response	

comment	*275* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of GAMA & ASD: CS-23.2165(a)(2) - As written the current requirement may appear to some to require envelope capable autopilots when the intend of this section was previously to assure that the autopilot could function safely in icing if it is used in that regime. We recommend that EASA clarify that the autopilot can either be disabled during icing or include protection from stalling when used in icing conditions.
response	

CS-23 — SUBPART C — STRUCTURES — CS-23.2200 Structural design envelope p. 26-27

comment	*69* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **Subpart C- Structure** The commentor supports the technical content of paragraphs.
response	

comment	*82* comment by: *Textron Aviation* **CS-23.2200 Structural design envelope** The word "all" implies that the applicant will have to evaluate an infinite number of parameters (that affect structural loads, strength, durability, and aeroelasticity) which is not feasible. Suggest retaining language similar to CS 23.2225(a)(1) which uses "each" and gives applicants a more feasible approach for showing compliance. ***Proposed Change:*** The applicant must account for <u>each</u> aeroplane design and operational parameters that affect structural loads, strength, durability, and aeroelasticity, including: Ideally any changes are harmonized with FAA. **CS-23.2200(e) Structural design envelope** Accounting for the redistribution of loads, if deflections under load would significantly change the distribution of external or internal loads is a basic engineering principle. The rule should not have to prescribe basic engineering principles. ***Proposed Change:*** Remove (e).
response	

comment	*234* comment by: *AEROMOBIL* **Subpart C- Structure** AEROMOBIL supports the technical content of paragraphs.
response	

comment	*251* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Structure** ELIXIR AIRCRAFT supports the technical content of paragraphs.
response	

comment	*276* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: The use of the word “all” could be seen to imply that infinite load cases need to be considered. We recommend that the word “each” with respect to design and operational parameters. Accounting for the redistribution of loads based upon deflection under load is a principle of basic engineering and it is unnecessary to include in this rule. We recommend section (e) be removed.
response	

CS-23 — SUBPART C — STRUCTURES — CS-23.2205 Interaction of systems and structures p. 27

comment	*29* comment by: *GE Aviation* The requirement is unbounded (could be interpreted as requiring multiple highly improbable failures to be addressed). Also, the requirement appears redundant with the proposed CS-23.2255. Suggest 23.2205 be removed.
response	

comment	*83* comment by: *Textron Aviation* **CS-23.2205 Interaction of systems and structures** The following sentence, “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.” Seems to imply functional hazard conditions involving structure. Is that the intent? Please clarify the intent of the sentence to say the applicant is expected to include functional failure conditions that in the past have been excepted from the 1309 process (i.e. 14 CFR

23.1309 (f) (2) at admt 49) or that those systems remain excepted or provide the AMJ that explains the intent.

CS-23.2205 Interaction of systems and structures

"Affect structural performance" seems too vague of term unless intent is very broad application. Doesn't every trim system, flight control system, and high lift system affect structural performance at some level? Is the real intent to capture special consideration for "structural performance" needs to be better defined. Suggest using the FAA NPRM preamble concepts to better define the term "structural performance", or simply just don't use the new term:

Proposed Change:
For airplanes equipped with systems which are intended to alleviate the impact of the requirements of this subpart and affect the structural design envelope, 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.

Ideally any changes are harmonized with FAA.systems that are providing some type of alleviation for other structural requirements normally imposed?

CS-23.2205 Interaction of systems and structures

The FAA NPRM preamble does not make it clear why the FAA has added §23.305 as a new requirement, which is now harmonized with CS-23.2205. The following is stated in the FAA NPRM preamble, "With or without the proposed §23.305 requirements, an applicant would have to account for structural performance with the system in its normal operating and failed states and evaluate the system for compliance to the proposed § 23.1315." If the FAA is going to use § 23.1315 as the high level safety intent, then adding the additional §23.305 does not add any additional safety intent. Likewise, if EASA indends to use CS 23.2510 as the high level safety intent, then adding CS 23.2205 does not add any additional safety intent.

Proposed Change:
If EASA is going to use CS-23.2510 to cover the safety intent anyway, then remove CS-23.2205.

Ideally any changes are harmonized with FAA.

response

comment *141* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH*

This is considered a new requirement as to show compliance to. "Affect structural performance" is a very open requirement, therefore some guidance is requested.

response

comment *277* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: The title of this requirement might mislead one to believe this

	rule is intended to account for systems safety analysis into aircraft structure which would be totally unwarranted and immeasurably burdensome. Assuming the intent is to provide for requirements when systems are designed and included to alleviate flight loads (such as active winglets) we recommend this section be clarified as to the intent.
response	

CS-23 — SUBPART C — STRUCTURES — CS-23.2220 Structural design loads p. 27

comment	*84* comment by: *Textron Aviation* **CS-23.2220 Structural design loads** (a)(1) This proposed rule specifies that loads from "ground and water operations" as well as "ground and water handling" are determined. This rule implies that all airplanes will be required to determine both ground and water loads; however, not all airplanes are amphibious. Suggest adding the phrase "as applicable" to allow the applicant to determine the loads appropriate for their configuration. (a)(1) The proposed rule specifies that "any" applied pressure, force, or moment must be determined. Loads criteria does not necessarily cover every possible load case possible. In some cases, the loads are calculated based on some simplified assumptions but the assumptions have been determined safe for a particular configuration. (For example, Appendix A of 14 CFR 23.) Suggest changing the word "any" to "likely". "Likely" gives the applicant the flexibility to use criteria which doesn't necessarily show all possible loadings, but is considered safe. (a)(1) This proposed rule specifies that mooring loads must be determined; however, mooring loads are not addressed in CS-23.2230 Ground and water load conditions. ***Proposed Change:*** (a)(1) Determine structural design loads, as applicable, 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 airplane is parked or moored. Ideally any changes are harmonized with FAA.
response	

comment	*142* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* (a)(3) Does "based on established physical principles" include "(established) conservative models"?
response	

comment	*162* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* 23.2220 (a)(3): The NPA proposal is harmonised with the NPRM, except that the reference to service history is removed because that will not always be available for innovative design.

	Nevertheless, DGAC France considers that the reference to service history should be kept for known design. Therefore DGAC France suggests the following alternative wording : "(3) [...] within the structural design envelope *and, if experience in service is available, may not be less than this experience shows will occur within the structural design envelope"*
response	

comment	*163* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* 23.2220 (a) : (b) does not exist so (a) can be deleted. Therefore DGAC France suggests the following re-wording : « The applicant must: (a) Determine structural design loads resulting from any 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; (b) Determine the loads required by paragraph (a)(1) of this section at all critical combinations of parameters, on and within the boundaries of the structural design envelope. (c) The magnitude and distribution of these loads must be based on established physical principles within the structural design envelope. »
response	

comment	*278* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: CS-23.2220(a)(1) - This section addresses ground and water loads but it should be clarified that these loads only need to be accounted for as they apply. For example, only an aircraft intended for on water operation would account for water loads. Further, we believe this section should address “likely” loads rather than “any” loads (any could include anything).
response	

CS-23 — SUBPART C — STRUCTURES — CS-23.2225 Flight load conditions p. 27-28

comment	*85* comment by: *Textron Aviation* **CS-23.2225(b) Flight load conditions** While it’s logical that the vibration and buffeting requirement is listed under “Flight Load Conditions”, from a delegation perspective this is typically an assessment performed by a flight test pilot. In terms of rule organization and harmonization, it would make sense to move this requirement back to CS-23.2155. This would align with the FAA NPRM, and would also keep the current philosophy on delegation the same as it is today. Move CS-23.2225(b) to CS-23.2155, “Vibration, buffeting, and high-speed characteristics” in order to harmonize with the FAA NPRM.
response	

comment	*164* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* 23.2225 (a): DGAC France undestands that EASA « does not support » paragraph (a) of the NPRM which is only based on measured gust statistics. We understand that EASA does not want to be so specific on the compliance means. Nevertheless, could EASA confirm that measured gust statistics would be acceptable if used by the applicant ?
response	

comment	*210* comment by: *DAHER* a) The term “likely” is not quantified, which could lead to disagreements on the interpretation without the kind of statement EASA provides in blue text. Such statement should be kept in final rule. Moreover, it is essential that the AMC set the acceptable design standards, as mentioned in NPA.
response	

comment	*279* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: CS-23.2225a - Does this set of load conditions include compressibility effects when significant? Will the guidance material that provides means of compliance to this section address this need for clarity?
response	

CS-23 — SUBPART C — STRUCTURES — CS-23.2230 Ground and water load conditions p. 28

comment	*216* comment by: *DAHER* The commentator would have clarification on the vision of the EASA on the Ground and water load conditions and in particularly on c) " the applicable landing surface"
response	

CS-23 — SUBPART C — STRUCTURES — CS-23.2235 Component loading conditions p. 28

comment	*182* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* (a) - A reference to Emergency Conditions should be added for completeness of possible components loading. (b) - This could be considered as a special factor and moved to AMC (consensus standard)
response	

CS-23 — SUBPART C — STRUCTURES — CS-23.2240 Limit and ultimate loads p. 29

comment	*86* comment by: *Textron Aviation* **CS-23.2240 Limit and ultimate loads** According to CS-23.2240 as its written, if a special factor is used to meet the requirements of this subpart, then the applicant doesn't need to establish limit loads. This is not true. Suggest rewording as shown. Since CS-23.2315(c) specifies that limit and ultimate loads are multiplied by special factors of safety, then CS-23.2240 doesn't need to address "special or other factors of safety" other than in some cases an ultimate load is specified. Ultimate loads are specified in CS-23.2270(a)(2) and CS-23.2270(a)(3). ***Proposed Change:*** CS-23.2240 Limit and ultimate loads. Unless ultimate loads are specified in this subpart, the applicant must determine — (a) The limit loads, which are equal to the structural design loads; and (b) The ultimate loads, which are equal to the limit loads multiplied by a 1.5 factor of safety. Ideally any changes are harmonized with FAA.
response	

CS-23 — SUBPART C — STRUCTURES — CS-23.2250 Structural strength p. 29

comment	*87* comment by: *Textron Aviation* **CS-23.2250(a)(1) Structural strength** Current CS 23.305 states, "the deformation may not interfere with safe operation." The proposed rule states the same thing but doesn't use the word "safe". Using the word "safe" further clarifies the intent of the rule. Leaving the word "safe" leaves out the descriptor for "interference", and assumes that interference will always get interpreted to mean interference which would cause an unsafe condition. Suggest adding the word "safe" back into the rule to clarify the intent of the rule, just as it reads in CS 23.305. ***Proposed Change:*** (a)(1) Interference with the safe operation of the airplane; and Ideally any changes are harmonized with FAA.
response	

comment	*183* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* (a) should read: "Limit loads without causing:"
response	

comment	*281* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: CS-23.2250(a)(1) - The current requirement addresses

	interference with operation but it should specify interference with "safe" operation. As written it would prevent any interference including standard flap seals and aileron seals. The word "safe operation" should be added.
response	

CS-23 — SUBPART C — STRUCTURES — CS-23.2255 Structural durability p. 29-30

comment	*28* comment by: *GE Aviation* Define "likely"
response	

comment	*88* comment by: *Textron Aviation* **CS-23.2255(a) Structural durability** While the language of 23.2255(a) is harmonized with the FAA NPRM, it makes little sense to define "loss of the airplane" as the criteria for which safety is assessed. This language could get interpreted from a different point of view where the airplane is damaged beyond repair; however, the there is no loss of life or injuries. For example, a gear up landing could damage an airplane to the point where someone would say there was a "loss of the airplane"; however, gear up landings rarely result in serious injuries. ***Proposed Change:*** Remove "loss of the airplane". It doesn't provide any further safety intent to the rule. Ideally any changes are harmonized with FAA.
response	

comment	*127* comment by: *Embraer S.A.* Embraer understands that it may have some structural damage caused by turbine engine rotor failure events that there is no way to eliminate all the risks that will prevent the continued safe flight and landing. Then, proposal is to revise the requirement text excepting those catastrophic failures that is demonstrated that cannot be avoided. Embraer suggests to revise the CS-23.2255 requiring minimization of such hazards as much as practical as follows: CS-23.2255 Structural durability (c) Except if demonstrated to be impossible to prevent the hazard, the aeroplane must be capable of continued safe flight and landing with likely structural damage due to hazards originating from high energy fragments, associated with systems and/or equipment failures, such as uncontained engine or rotating machinery failure.
response	

comment	*167* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* 23.2255 (b) : DGAC France considers that this requirement is applicable for all Certification Levels. So "appropriate to the certification level" wording is ambiguous. Therefore, by reference to the NPRM, DGAC France suggests the following alternative wording : *"(b) Appropriate to the design and operational envelope, the aeroplane is designed [...]"*
response	

comment	*217* comment by: *DAHER* a) The commentator would know what it is considered behind the wording "reduced safety margins"? The Interval of inspection is limited to secure "Multiple Load Path" criteria? b) Do these two sub-paragraph suggest that Damage Tolerance (including propagation) could be applied for covering those periods of operation where the structure of the aircraft is damaged? (Seems similar to CS-23.571 to CS-23.575).
response	

comment	*280* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: We believe the EASA is indicating that "reduced safety margins" is an indication of traditional manufacturing variance and service wear. Is this an accurate assumption? Subparagraph (b) seems to suggest that Damage Tolerance (including propagation) could be applied for covering those periods of operation where the structure of the aircraft is damaged? (Seems similar to CS-23.571 to CS-23.575). Can you please clarify? The current proposal includes the term "loss of the aeroplane". This term doesn't add anything to the requirement and can be seen as confusing. We recommend it be deleted.
response	

CS-23 — SUBPART C — STRUCTURES — CS-23.2260 Aeroelasticity p. 30

comment	*89* comment by: *Textron Aviation* **CS-23.2260(a)(2) Aeroelasticity** Proposed CS-23.2260(a)(2) requires "any" configuration to be flutter-free. It is not practical to evaluate any possible configuration, payload arrangements, mass balance states, etc. Suggest adding the word "likely" to allow practical application and interpretation of the rule. ***Proposed Change:***

(a)(2) For any <u>likely</u> configuration and condition of operation;

Ideally any changes are harmonized with FAA.

CS-23.2260(b) Aeroelasticity

Proposed CS-23.2260(b) requires that the applicant "establish and account for tolerances for all quantities that effect flutter." The word "tolerance" has a very specific meaning and would require the applicant to specify a +/-X% tolerance on things such as cross sectional properties (torsional GJ), cross sectional moments of inertia, or other qualities that affect flutter but aren't intended to have a +/-X% tolerance. A flutter analysis document is in essence a huge collection of sensitivity analyses. Suggest rewording the language to remove "tolerances" and specify "sensitivities".

<u>Proposed Change:</u>
(b) The applicant must account for sensitivities in all parameters that affect flutter.

Ideally any changes are harmonized with FAA.

response

comment *282* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: CS-23.2260(a)(2) Aeroelasticity:
Currently this requirement requires any configuration to be flutter free. This would present infinite test points. We recommend the term "likely" configurations as is traditional the case.

response

CS-23 — SUBPART C — STRUCTURES — CS-23.2270 Emergency conditions p. 30-31

comment *90* comment by: *Textron Aviation*

CS-23.2270(a)(2), (a)(3), (b)(1) Emergency conditions

EASA states that "dynamic" should be covered by AMC; however, EASA chose to leave "static" in the rule language for (a)(2) and (a)(3). This is inconsistent. It appears that (a)(2) and (a)(3) came from the original static only requirements for occupants and items of mass, while CS-23.2270(b) came from the dynamic seat requirements. When all of the prescriptive language was removed, it now appears inconsistent because the language is mixing static requirements with dynamic requirements, and they are different. Since (a)(2) and (a)(3) specifically require "ultimate static inertia loads", it could be argued that the entire CS-23.2270 rule completely lost the dynamic loads requirement. The language in (b)(1) states that conditions likely to occur must be included, but those conditions are specified in (a) and result in a static ultimate load per (a)(2) and (a)(3), and they do not result in any dynamic loads which is a requirement today. The occupant requirement of (a)(2) really requires both static and dynamic evaluation, while the items of mass requirement of (a)(3) is simply a static inertia load requirement and doesn't need the evaluation of (b). This clarification would also prevent someone from applying (b)(2) to items of mass instead of the intent which is HIC. (b)(2) is addressing the occupant potentially hitting the structure, rather than items of

mass hitting the occupant. This needs to be clarified or it will get misinterpreted.

Suggest changing (a)(2) by removing "ultimate static" from the language. Change (b) to only refer to (a)(2) since (b)(1) and (b)(2) really have nothing to do with static inertia loads related to items of mass.

Proposed Change:
CS-23.2270 Emergency conditions.
(a) The airplane, 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 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 paragraph (a)(2) of this section, must—
(1) Include conditions that are likely to occur with an impact at stall speed, accounting for variations in aircraft mass, flight path angle, flight pitch angle, yaw, and airplane configuration, including likely failure conditions at impact; and
(2) Not exceed established human injury criteria for human tolerance due to restraint or contact with the objects in the airplane.

Ideally any changes are harmonized with FAA.

response

comment *184* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH*

(a)(3) - "including engines or APU" is explanatory language (and may not be relevant for future designs) and should therefore be moved to AMC or worded with general terms
(c) - as worded, it is not clear that maximum load factors may include Emergency Conditions in certain directions

response

comment *218* comment by: *DAHER*

c) The commentator would like EASA to clarify the following sentences:
Are emergency landing conditions included in those ground loads?
This complete article CS-23-2270 does not state clearly if return of experience or dynamic analyses could be used for structural sizing

response

comment *283* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: CS-23.2270(c) - Is this intended to include ground loads?

response

CS-23 — SUBPART D — DESIGN AND CONSTRUCTION — CS-23.2300 Design and construction principles p. 31

comment	*70* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **Subpart D - Design and Construction** The commentor supports the technical content of paragraphs.
response	

comment	*91* comment by: *Textron Aviation* **CS-23.2300(d) Design and construction principles** The specific types of loads were removed from CS-23.2300(d); however, the requirement still lists “air loads” which is a specific type of load. This is incorrect. Control systems are subject to either limit airloads or pilot effort loads, whichever is less. Using airloads for secondary control systems is also problematic. If a secondary control system uses an irreversible actuator, applying airload does not load the system if it were a cable and pulley system. This rule must be further clarified to work with all systems and loading scenarios. As written, (d) has lost the safety intent of the original language. Change the language to specify “control system” instead of “aeroplane”. The loads introduced by the aeroplane is not the only thing that loads the control system. The pilot loads the control system too. Specify “limit loads” instead of “limit airloads”, so the loads now include pilot effort loads as specified in the ASTM standard. ***Proposed Change:*** The control system must be free from jamming, excessive friction, and excessive deflection when the control system is subjected to expected limit loads. Ideally any changes are harmonized with FAA.
response	

comment	*185* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* (b) - "Design data must adequately define [...] ANY materials and processes used" is very tight and leaves no room for production specifics (auxiliary materials used which have no effect on the final product, tooling/assembly depending on production rate, local laws, ... currently defined in production data), consider using RELEVANT instead of ANY.
response	

comment	*233* comment by: *AEROMOBIL* **Subpart D - Design and Construction** AEROMOBIL supports the technical content of paragraphs.

response

comment *252* comment by: *ELIXIR AIRCRAFT Head of Airworthiness*

Design and Construction
ELIXIR AIRCRAFT supports the technical content of paragraphs.

response

comment *284* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: CS-23.2300(d) - The specific types of loads were removed from CS-23.2300(d); however, the requirement still lists “air loads” which is a specific type of load. This is incorrect. Control systems are subject to either limit airloads or pilot effort loads, whichever is less. Using airloads for secondary control systems is also problematic. If a secondary control system uses an irreversible actuator, applying airload does not load the system if it were a cable and pulley system. This rule must be further clarified to work with all systems and loading scenarios. As written, (d) has lost the safety intent of the original language.

Change the language to specify “control system” instead of “aeroplane”. The loads introduced by the aeroplane is not the only thing that loads the control system. The pilot loads the control system too. Specify “limit loads” instead of “limit airloads”, so the loads now include pilot effort loads as specified in the ASTM standard.

The wording should be changed to: “The control system must be free from jamming, excessive friction, and excessive deflection when the control system is subjected to expected limit loads.” Ideally any changes are harmonized with FAA.

response

CS-23 — SUBPART D — DESIGN AND CONSTRUCTION — CS-23.2310 Materials and processes p. 32

comment *92* comment by: *Textron Aviation*

CS-23.2310(e) Materials and processes

Proposed CS-23.2310(e) uses the word “essential” which has not been used or defined historically in Part 23 structural compliance.

Proposed Change:
Suggest changing this word to “critical” since the word “critical” is more often used and better defined.

Ideally any changes are harmonized with FAA.

response

CS-23 — SUBPART D — DESIGN AND CONSTRUCTION — CS-23.2315 Special factors of safety p. 32-33

comment	*166* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* The DGAC fully supports the approach of EASA on the rationale relating to (c) considering the NPRM is more severe without it being necessary to date. However if the NPRM remains with the same wording, the validation of European TC would be difficult considering the difference.
response	

CS-23 — SUBPART D — DESIGN AND CONSTRUCTION — CS-23.2320 Flight control systems p. 33-34

comment	*10* comment by: *René Meier, Europe Air Sports* page 33/53 CS-23.2320 Flight control systems (c) Please add a space between "level" and the figure "3".
response	

comment	*49* comment by: *UK CAA* **Page No:** 34 **Paragraph No:** CS-23.2320 Flight control systems, paragraphs (a)(1) and (b)(1) **Comment:** CS-23.2320 Flight control Systems paragraphs (a)(1) and (b)(1) are worded such that the flight control system and trim systems must respectively: "Prevent major, hazardous, and catastrophic hazards, including and "Prevent inadvertent, incorrect or abrupt trim operation". By requiring that the applicant "prevent" these conditions, an absolute is demanded. However, it is believed that the intent was to consider the cited failures in a manner that would be comparable with CS-23.2510 (CS23.1309), to the extent that any such failure could only be tolerable if its probability was inversely proportional to the severity of the effect. Thus, it is proposed that by rewording the requirements to reflect the standard safety assessment approach promoted by "1309" and now by 2510, an appropriate assessment could be undertaken. **Justification:** The only effective means to prevent hazards and incorrect trim operations would be to deactivate the systems or possibly ground the aircraft. This is not thought to be the intent of the requirement and a proposal is provided. **Proposed Text:** Amend to read: (a) The flight control systems must: (1) Prevent major, hazardous, and catastrophic hazards **occurring more frequently than**

required by CS-23-2510(a)(2), including:

(i) likely failure conditions;
(ii) Operational hazards;
(iii) Asymmetry; and
(iv) Misrigging

(2) Operate easily, smoothly, and positively enough to allow normal operation.

(b) Trim systems must:

(1) Prevent inadvertent, incorrect, or abrupt trim operation **events more frequently than required by CS-23-2510(a)(2)**;

(2) Provide a means to indicate:

(i) The direction of trim control movement relative to aeroplane motion;
(ii) The trim position with respect to the trim range;
(iii) The neutral position for lateral and directional trim; and
(iv) The range for take-off for all applicant-requested centre of gravity ranges and configurations.

(3) Limit the range of travel to allow safe flight and landing if an adjustable stabiliser is used.

response

comment *93* comment by: *Textron Aviation*

CS-23.2320(a)(1) Flight control systems

Is there an accepted probability of "prevent" in this context? Does it vary with hazard classification?

Reword or define "prevent"

CS-23.2320(b)(1) Flight control systems

Is there an accepted probability of "prevent" in this context? Does it vary with hazard classification?

Reword or define "prevent"

CS-23.2320(c) Flight control cystems

This paragraph implies that trim and flaps are the only elements required for a takeoff warning system (by implication since if I demonstrate these two; I am not required to have one). Is this really the intent of this rule?

Consider a more performance based requirement where items that can preclude a safe takeoff need to be alerted to the crew.

response	

comment	*168* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* 23.2320 (b)(3): "if an adjustable stabilizer is used" is design specific. Therefore DGAC France suggests the following alternative wording : *"(b)(3) Limit the range of travel to allow safe flight and landing".*
response	

comment	*211* comment by: *DAHER* a) The term “likely” is not quantified, which could lead to disagreements on the interpretation without the kind of statement EASA provides in blue text. Such statement should be kept in final rule. Moreover, it is essential that the AMC set the acceptable design standards, as mentioned in NPA.
response	

CS-23 — SUBPART D — DESIGN AND CONSTRUCTION — CS-23.2325 Landing gear systems p. 34-35

comment	*11* comment by: *René Meier, Europe Air Sports* page 34/53 CS-23.2325 Landing gear system 3rd para Insider question: What is the difference between a "rejected take-off" and an "aborted take-off"?
response	

comment	*94* comment by: *Textron Aviation* **CS-23.2325(c) Landing gear systems** This requirement appears to require some type of braking system on aeroplanes equipped with skis or floats. If that was the intention some clarifying explanation should be added. If not intended to apply to all types of landing systems please add wording to limit the application or consider that the requirement to have a system to stop the aeroplane would be necessary to meet CS-23.2500 and remove the requirement completely.
response	

comment	*285* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: CS-23.2325(c) - The current wording of this section may mislead one into believing that seaplanes and skiplanes need to include braking systems. Perhaps this section can better address landing performance accounting for non-optimal landing surfaces when intended.

response

CS-23 — SUBPART D — DESIGN AND CONSTRUCTION — CS-23.2335 Means of egress and emergency exits p. 35-36

comment *179* comment by: *Federal Office of Civil Aviation (FOCA), Switzerland*

Comment FOCA:
It is recommended to keep the 90-second in the hard-requirement. Experience has clearly demonstrated that this value is effective and can be achieved with a proportionate effort, regardless of the aircraft size.
Moreover, by doing so another non-harmonized requirement is avoided. This should always be seen as an overarching fundamental requirement of this rulemaking task.

(a)(1) The alleviation for ditching requirements has also to be harmonized. Only applicable to level 3 and 4 multiengine

response

CS-23 — SUBPART D — DESIGN AND CONSTRUCTION — CS-23.2340 Occupant physical environment p. 36

comment *169* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

23.2340(a)(2): Only the pilot is protected against serious injury due to hazards originating from high energy [...]. DGAC France considers that all the occupants should be protected.
Therefore DGAC France suggests the following alternative wording : *"Protect the occupants against serious injury due to hazards originating from high energy [...]"*

response

comment *286* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: CS-23.2340(b) - As currently written this requirement is not very objectively based. It would be better written as: “the aircraft must protect the crew from collision with birds that might penetrate the windscreen or prevent safe landing during approach and landing phases of flight

response

comment *310* comment by: *Garmin International*

The regulation is test and design specific and not safety objective or performance based. As a note only, withstanding a two pound bird without penetration would not prevent the event from making the windshield opaque.

Suggest changing to:

	"(b) For level-4 aeroplanes, the aircraft design must provide for protection of the aircraft and crew from collision with birds that would penetrate the windscreen or prevent safe landing during approach and landing."
response	

CS-23 — SUBPART D — DESIGN AND CONSTRUCTION — CS-23.2345 Fire protection outside designated fire zones p. 37

comment	*123* comment by: *Embraer S.A.* In addition to the comment 122, Embraer understands that current CS-23.1181, defines the "*hot*" parts of an engine installation as an ignition source and considering that there are fuel, oil and hydraulic fluids being carried around such areas, they shall be considered a fire zone and then the term "*designated*" would apply, which means that it is not necessary further analysis to define if it is a flammable fluids zone or a fire zone. Embraer suggests to EASA to rephrase the CS-23.2345 (b) (3) as follow: CS-23.2345 Fire protection outside ~~designated~~ fire zones (b) The aeroplane is designed to minimise the risk of fire propagation by: (3) Specifying ~~designated~~ fire zones that meet the specifications of CS 23.2350.
response	

CS-23 — SUBPART D — DESIGN AND CONSTRUCTION — CS-23.2350 Fire protection in designated fire zones p. 37

comment	*95* comment by: *Textron Aviation* **CS-23.2350 Fire protection in designated fire zones** As written he context for "terminals" and "equipment" is not clear. Is the requirement intended to apply only the "electrical terminals" and electrical equipment"? If the intent is for the requirement to only apply to electrical terminals and electrical equipment, please add the word electrical or other words to define the type of terminals and equipment the regulation applies to. **CS-2350(b) and (c) Fire protection in designated fire zones** Doesn't (b): "not preclude continued safe flight and landing" address material and wire selection of (c)? It seems like fire resistant wire is "a" way to meet this requirement and therefore belongs in guidance. Delete (c) as it is not required in the rule.

response	

comment	*124* comment by: *Embraer S.A.* In addition to the comment 122, Embraer understands that current CS-23.1181, defines the "*hot*" parts of an engine installation as an ignition source and considering that there are fuel, oil and hydraulic fluids being carried around such areas, they shall be considered a fire zone and then the term "*designated*" would apply, which means that it is not necessary further analysis to define if it is a flammable fluids zone or a fire zone. Embraer suggests to EASA to rephrase the CS-23.2350 (b) as follow: CS-23.2350 Fire protection in ~~designated~~ fire zones (b) A fire in a ~~designated~~ fire zone must not preclude continued safe flight and landing;
response	

comment	*287* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: As written he context for "terminals" and "equipment" is not clear. Is the requirement intended to apply only the "electrical terminals" and electrical equipment"?
response	

CS-23 — SUBPART D — DESIGN AND CONSTRUCTION — CS-23.2355 Lightning protection of structure p. 37

comment	*180* comment by: *Federal Office of Civil Aviation (FOCA), Switzerland* **CS-23.2355, CS-23.2515** Text: "...*The reference to IFR is replaced by the risk of exposure to lightning."* *Comment FOCA:* The intent of the EASA proposal is understood and is seen as strengthening of the FAA requirement. Is there service experience evidences to justify this? In our opinion, priority should be given to harmonization.
response	

comment	*212* comment by: *DAHER* a) The term "likely" is not quantified, which could lead to disagreements on the interpretation without the kind of statement EASA provides in blue text. Such statement should be kept in final rule. Moreover, it is essential that the AMC set the acceptable design standards, as mentioned in NPA. Please use NPRM wording, since type of operation adequately prevents use in type of environments for which the A/C is not designed.

response

CS-23 — SUBPART E — POWERPLANT — CS-23.2400 Powerplant installation p. 38-39

comment *12* comment by: *René Meier, Europe Air Sports*

page 38/53
Subpart E Powerplant
Title
CS-23.2400
We propose to rename Subpart E "Propulsion system" instead of "Powerplant"and to change the text accordingly.

Rationale:
In our view the entire propulsion system is meant when we read the provisions proposed. On today's aeroplane powerplant and propulsion are in most cases closely connencted. Electric engines may allow the powerplant be installed in the fuselage, the propulsion e.g. in the vertical fin, at quite a distance. For this reason, the entire system should be addressed.

Insider question:
Would a range extender need a certificate when the endurance on batteries only is 30 minutes?

response

comment *30* comment by: *GE Aviation*

The language is too broad without a limitation on “likely” Foreign object threats exist which are beyond the technical capability of the airplane to resist. The rule must accommodate that concept.
Introduction of “hazards to ground personnel” is a new requirement compare to existing rules, and would be a barrier to compliance. The movements of ground personnel are outside the control of the applicant. Engines inherently have regions which are unsafe to approach while the engine is operating (engine inlets, propellers, hot exhaust); this is a general and unavoidable feature, not specific to installation design.

We suggest that EASA define “likely” and remove b(3).

response

comment *71* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)*

Subpart E - Powerplant
The commentor supports the technical content of paragraphs.

response

comment *96* comment by: *Textron Aviation*

	CS- 23.2400 Powerplant installation. (f) For the purpose of this subpart, “Energy” means any type of energy for the powerplant, including for example fuels of any kind, or batteries. (f) is a definition and not a requirement. Content should be moved to a definition section.
response	

comment	*189* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* General: Consider grouping of definitions and requirements. e.g. (f) should be grouped with (a) to start off with the definitions (d) is an appreciated flexibility provision. Some initial guidance should be provided upon to what extent this can be used with or without SC, ELOS, AMC-CRI.
response	

comment	*219* comment by: *DAHER* e) For clarification, the commentator proposes to replace "As applicable" by "Appropriate to the certification level,"
response	

comment	*232* comment by: *AEROMOBIL* **Subpart E - Powerplant** AEROMOBIL supports the technical content of paragraphs.
response	

comment	*253* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Powerplant** ELIXIR AIRCRAFT supports the technical content of paragraphs.
response	

comment	*288* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: Perhaps the definition of energy should be in the definitions section rather than in the powerplant section.
response	

comment	*289* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: CS-23.2400(e) - For clarification, suggestion to replace "As applicable" by "Appropriate to the certification level,"

response

CS-23 — SUBPART E — POWERPLANT — CS-23.2405 Propulsion augmentation systems p. 39

comment *13* comment by: *René Meier, Europe Air Sports*

page 39/53
CS-23.2405
We propose to change title and text from "Propulsion augmentation systems" to "Propulsion control systems" .

Rationale:
Our term fits better with the purpose of the system, propulsion will be controlled, not augmented, propulsion control includes power increase as well as power reduction, propulsion augmentation in our view only includes power increase.

response

comment *97* comment by: *Textron Aviation*

CS-23.2405 Propulsion augmentation systems

As written (c) and (d) are not written as requirements. Requirement (c) makes it impossible to certify a single engine aircraft since there are multiple single failure conditions on those installations. This requirement could easily be covered under CS 23.2410 and therefore could be removed.

(d) Inadvertent operation of the system by flight crew must be prevented or it must be capable of being restored without resulting in an unsafe condition

response

comment *129* comment by: *Embraer S.A.*

In the proposed CS-23.2405 (e) it is required that "*Unless failure of a propulsion augmentation system is 'extremely remote', any automatic propulsion augmentation system must:*"

Embraer understands that the intent is to guarantee that the failure probability is at least extremely remote or lower values. Then, Embraer proposes to replace the term "is" by "is equal or less than".

Embraer suggests to rephrase the proposed CS-23.2405 as follows:

CS-23.2405 Propulsion augmentation systems

(e) Unless failure probability of a propulsion augmentation system is equal or less than 'extremely remote', any automatic propulsion augmentation 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 deactivate the automatic function; and

(3) Prevent inadvertent deactivation.

response

comment *290* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: As written (c) and (d) are not written as requirements. Requirement (c) makes it impossible to certify a single engine aircraft since there are multiple single failure conditions on those installations. This requirement could easily be covered under CS 23.2410 and therefore could be removed.

response

comment *291* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of GAMA & ASD: CS-23405(e)(2) - With emerging technology, it may be systems with sufficient design integrity to allow for systems that cannot be deactivated by the pilot. This requirement should be modified or removed.

response

comment *311* comment by: *Garmin International*

Proposed 23.2405(e)(2) states that if there is an automatic thrust or drag augmentation system that there must be a means for the pilot to deactivate it.

In the B777 Air Asiana accident at KSFO, the crew deactivated the automatic low speed thrust system that was designed to prevent a stall, then stalled the aeroplane short of the runway.

With emerging technology, there may be systems with sufficient design integrity and provide enough safety benefit that proposed 23.2405(e)(2) has the unintended effect of reducing system safety.

Suggest removing 23.2405(e)(2) to allow these emerging technologies to increase system safety.

response

CS-23 — SUBPART E — POWERPLANT — CS-23.2410 Powerplant installation hazard assessment p. 39-40

comment *31* comment by: *GE Aviation*

Single failures exist for engines which can cause sufficient airplane damage that safe flight and landing is not possible. This is a feature inherent to engines and not the result of a specific design. The probability of such an initiating failure is low and the likelihood of severe airplane damage is also low, but not zero. The wording of CS-23.2410 needs to allow for this.
The phrase "cause serious injury" could be considered to apply to ground personnel. The movements of ground personnel are outside the control of the applicant. Engines inherently have regions which are unsafe to approach while the engine is operating (engine inlets, propellers, hot exhaust); this is a general and unavoidable feature, not specific to installation design.
We suggest EASA consider the alternate wording:
"to show that a failure of any powerplant system component or accessory has an acceptably low probability of:
(1) preventing safe flight and landing
(2) causing serious injury to occupants"

response

comment *98* comment by: *Textron Aviation*

CS-23.2410 Powerplant installation hazard assessment.

Language is too high level and is already covered by the proposed CS 23.2510 language at the airplane level.

Revert back to A-NPA language found in 23.510 that includes specific propulsion hazards to consider.

response

comment *128* comment by: *Embraer S.A.*

Embraer understands that turbine engine will continue to be installed in new airplanes and the proposed CS-23.2410 does not cover the particular hazards of conventional powerplant failures such as rotor failure and burn through events.

Embraer suggests to revise the proposed CS-23.2410, requiring minimization of such hazards as much as practical, as follows:

CS-23.2410 Powerplant installation hazard assessment

(a) The applicant must assess each powerplant separately and in relation to other aeroplane systems and installations to show that ~~a failure of any powerplant system component or accessory will not~~:

(1) There is reasonable assurance that operating limitations that may adversely affect rotating machinery structural integrity will not be exceeded in service.

(2) Design precautions to minimize the hazards to the airplane in the event of an uncontained engine rotor or rotating machinery failure or of a fire originating within the engine which burns through the engine case are taken.

	(3) Any other failure of any powerplant system component or accessory, not foreseen at section (2) of this requirement, will not: (i) Prevent continued safe flight and landing; (ii) Cause serious injury that may be avoided; and (iii) Require immediate action by crew members for continued operation of any remaining powerplant system.
response	

comment	*220* comment by: *DAHER* Requirement about the rotor burst: The commentator would like EASA to clarify the following wording : "will not prevent" --> Should be relative to the probability of the event.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2415 Powerplant ice protection p. 40

comment	*14* comment by: *René Meier, Europe Air Sports* page 40/53 CS-23.2415 Proposal to change title/text from "powerplant ice protection" to "propulsion system ice protection". Rationale: The entire system must be protected form ice and snow likely to affect a flight.
response	

comment	*100* comment by: *Textron Aviation* **CS-23.2415 Powerplant Ice Protection** This rule was added due to influence from the NPRM and is not required if CS-23.2410 is written at an appropriate level. Remove requirement after the language in 23.2410 reverts back to A-NPA language found in 23.510 that includes specific propulsion hazards to consider.
response	

comment	*170* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department* 23.2415(a): The DGAC fully supports the approach of EASA.
response	

comment	*188* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* (b) Mitigation should be an acceptable means for reciprocating engine installations like “alternate air”.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2420 Powerplant fire protection p. 40

comment	*15* comment by: *René Meier, Europe Air Sports* page 40/53 CS-23.2420 Proposal to change title/text from "powerplant fire protection" to "propulsion system fire protection". Rationale: The entire system must be protected form ice and snow likely to affect a flight.
response	

comment	*101* comment by: *Textron Aviation* **CS-23.2420 Powerplant Fire Protection** This rule was added due to influence from the NPRM and is not required if CS-23.2410 is written at an appropriate level. Remove requirement after the language in 23.2410 reverts back to A-NPA language found in 23.510 that includes specific propulsion hazards to consider.
response	

comment	*131* comment by: *Embraer S.A.* Embraer understands that if the amount of fuel that may enter into powerplant is not hazardous, so that it will not feed the fire, it also should be considered as an acceptable means of compliance. Embraer suggests to EASA to rephrase the CS-23.2420, as follows: CS-23.2420 Powerplant fire protection There must be means to isolate or otherwise prevent hazardous quantities fuel or flammable material from entering powerplant, mitigating the ~~and mitigate~~ hazards to the aircraft in the event of a powerplant system fire or overheat in operation.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2425 Powerplant operational characteristics p. 40

comment *16* comment by: *René Meier, Europe Air Sports*

page 40/53
CS-23.2425
Proposal to change title/text from "powerplant operational characteristics" to "propulsion system operational characteristics".

Rationale:
The entire system must be designed to fulfil (a) and (b).

response

comment *32* comment by: *GE Aviation*

As currently written, this is not a requirement, rather it is a statement. As re-written in the proposed text it is a requirement.
It ~~is~~ must be possible to safely shut down and, if necessary, stop continued rotation after shut down and safely restart an engine in flight

Any techniques and associated limitations for engine starting and stopping ~~are~~ must be established

response

comment *102* comment by: *Textron Aviation*

CS-23.2425 Powerplant Operational Characteristics

As currently written, this is not a requirement, rather it is a statement. As re-written in the proposed text it is a requirement.

(a) It ~~is~~ must be possible to safely shut down and, if necessary, stop continued rotation after shut down and safely restart an engine in flight

(b) Any techniques and associated limitations for engine starting and stopping ~~are~~ must be established

response

comment *126* comment by: *Embraer S.A.*

Embraer understands that proposed CS-23.2425 is not addressing the adverse effects evaluation of air inlet distortion, powerplant handling, negative acceleration operating characteristics and other adverse effects of an installed engine/power unit.

Embraer suggests to include a paragraph for operating characteristics investigation as follows:

	CS-23.2425 Powerplant operational characteristics (a) It shall be demonstrated that it is possible to safely shut down and, if necessary, stop continued rotation after shut down and safely restart an engine in flight. (b) Any techniques and associated limitations for engine starting and stopping are established. (c) The powerplant handling and operating characteristics must be investigated in flight to determine that no adverse characteristics are present, to a hazardous degree, during normal and emergency operation, including negative acceleration operation, within the range of operating limitations of the airplane and of the aircraft power unit.
response	

comment	*190* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* Subpart E, beginning with 23.2425 the language style changes from a prescriptive (must be) to a descriptive (is, are) style.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2430 Energy storage and distribution system hazard mitigation p. 40-41

comment	*33* comment by: *GE Aviation* The concept “a hazard to the propulsion system” is unclear. Failure of an engine accessory can cause an engine to shut down, since they share fluid systems and are mechanically connected. This is inherent to the concept of engine accessories and is not a feature of a specific design. Some of these failures can also result in fire within a designated fire zone. Mitigations exist that prevent this scenario being a hazard at the airplane level. The wording proposed would create a barrier to certification for all current airplane designs. It would be preferable to consider the hazard at the airplane level, in which case the requirement is already covered by 23.2410. We propose (e) be deleted.
response	

comment	*99* comment by: *Textron Aviation* **CS-23.2430 Energy storage and distribution system hazard mitigation** Language is too high level and is already covered by the proposed CS 23.2510 language at the airplane level. As currently written, this is not a requirement, rather it is a statement. As re-written in the proposed text it is a requirement.

(a) The fuel/energy system~~, containing high amount of energy, is~~ must be designed to minimise hazards to the occupants in case of survivable emergency landings. For Airworthiness Level 4 aircraft, failure due to overload of the landing system is taken into account.

(b) Hazardous accumulations of fluids, vapours or gases ~~are~~ must be isolated from ~~the aeroplane~~ ignition sources and personnel compartments and must be safely contained, vented or drained

(c) Powerplant system hazards ~~in~~ resulting from maintenance activities, ~~and during~~ ground handling or operation ~~are~~ must be mitigated by design or procedures

(d) For Airworthiness Level 4 aeroplanes, overloading the main landing gear during take-off or landing (assuming the overloads are acting in the upward and aft direction) ~~does~~ must not cause the release of a hazardous amount of high energy.

(e) Any likely single failure of an accessory directly interacting with the propulsion system ~~does~~ must not create a hazard to the propulsion system

CS-23.2430(b) Energy storage and distribution system hazard mitigation

If I safely vent, contain or drain fluids, how can they be “hazardous accumulations”?

Was: Hazardous accumulations of fluids, vapours or gases are isolated from the aeroplane and personnel compartments, and are safely contained, vented or drained.

Proposed: Hazardous accumulations of fluids, vapours or gases are isolated from the aeroplane and personnel compartments, **or** are safely contained, vented or drained.

response

comment *197* comment by: *CAA-NL*

CS-23.2430: in (a), we propose to use "landing gear" instead of "landing system". Also, the rest of the proposed CS 23 document uses terminology like "level 4" instead of "certification level-4".

response

comment *292* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: CS-23.2430(b) - This section should be worded as: “Hazardous accumulations of fluids, vapours or gases are isolated from the aeroplane and personnel compartments, **or** are safely contained, vented or drained.”

response

CS-23 — SUBPART E — POWERPLANT — CS-23.2435 Powerplant support systems p. 41

comment	*17* comment by: *René Meier, Europe Air Sports* page 41/53 CS-23.24355 Proposal to change title/text from "powerplant support systems" to "propulsion system support (systems)". Rationale: Our proposal fits better with the intent of the provisions. We propose to reword a little bit (g): Please replace "the pilot" by "the flight crew". Rationale: It fits better when we deal with other than single crew aeroplanes.
response	

comment	*34* comment by: *GE Aviation* Requirement (a) is a definition and not a requirement. Requirement (f) states “Ingestion of likely foreign objects that would be hazardous to the engine is prevented.” The original intent of this rule element was ice accumulation on the inlet/ airplane; the wording has now been broadened to cover all foreign objects and the rule now becomes redundant with the proposed 23-2400. Note: Foreign object threats exist which are beyond the technical capability of the airplane to resist. The rule must accommodate that concept. Requirement (h) that states “Any likely single failures of powerplant support systems that results in a critical loss of thrust are mitigated” needs to be revisited as it would essentially make a single engine aircraft not certifiable. We propose: Delete (f) or limit the scope to ice shedding as in the current rules Delete (h)
response	

comment	*103* comment by: *Textron Aviation* **CS-23.2435 Powerplant Support Systems** Requirement (a) is a definition and not a requirement. Many of the requirements are listed as statements and not requirements. Required (h) that sates “Any likely single failures of powerplant support systems that results in a critical loss of thrust are mitigated” needs to be revisited as it would essentially make a single engine aircraft not certifiable. This requirement needs well developed guidance to answer basic questions. What defines a high energy fragment? Is this intended to mean an engine rotor fragment, or any rotating fragment such as the cooling fan on a

starter/generator? Clear guidance must be provided to avoid requirement creep. It also needs to be clarified if this requirement is truly meant at an engine installation level (like the current §23.903(b) rotor non-containment analysis) or if it is only applicable to the powerplant support systems since that is the section it is written in.

Revert back to A-NPA language especially by replacing (h) with the language found in the A-NPA under CS 23.510.

response

comment *130* comment by: *Embraer S.A.*

Embraer understands that the text of the section (g) of paragraph CS-23.2435 should be clarified in its intent. Embraer is understading that the aircraft design and induction system shall prevent distortion as described on current CS-23.939(c).

Besides, Embraer understands that the term “shall” would better represent the intent of the other sections of this paragraph.

CS-23.2435 Powerplant support systems

(a) Powerplant 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 system.

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

(c) Powerplant support systems ~~are~~ shall be 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 performance ~~are~~ shall be established.

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

(g) The ~~pilot must be aware of the~~ air intake configuration ~~and able to influence it.~~ must supply the air required by that powerplant and its accessories by that powerplant and its accessories under expected operating conditions.

(h) The air intake configuration must not, as a result of airflow distortion during normal operation, cause vibration harmful to the powerplant.

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

response

comment	*213* comment by: *DAHER* d) The term “likely” is not quantified, which could lead to disagreements on the interpretation without the kind of statement EASA provides in blue text. Such statement should be kept in final rule. Moreover, it is essential that the AMC set the acceptable design standards, as mentioned in NPA. d) For clarification, the commentator proposes to replace "likely to occur" by "for which certification is seeked" g) The commentator would have clarification on the sense of the following sentence: « The pilot must be aware of the air intake configuration” What kinds of equipment are concerned?
response	

comment	*293* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: CS-23.2435(d) - For clarification, we suggest "likely to occur" be replaced by "for which certification is sought"
response	

comment	*294* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: CS-23.2435(g) - The requirement that “The pilot must be aware of the air intake configuration” seems to apply to certain technologies. What is EASA specifically concerned about, perhaps this rule should be a slightly higher level.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2440 Energy system — General p. 41

comment	*104* comment by: *Textron Aviation* **CS-23.2440 Energy System — General** These requirements are written as statements not as requirements. As suggested in the A-NPA change the word “is” to “must be” in all the requirements.
response	

comment	*214* comment by: *DAHER* c) The term “likely” is not quantified, which could lead to disagreements on the interpretation without the kind of statement EASA provides in blue text. Such statement should be kept in final rule. Moreover, it is essential that the AMC set the acceptable design standards, as mentioned in NPA.

	c) The commentator would have clarification of the wording " likely energy fluctuation "
response	

comment	*295* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: CS-23.2440(c) Please clarify what is intended to be addressed by "likely energy fluctuation"
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2445 Energy system independence p. 42

comment	*105* comment by: *Textron Aviation* **CS-23.2445 Energy system independence** What is the rational for make this a separate rule? Couldn't it be combined with something else? Seems to be a pretty specific stand alone rule. There are too many energy specific requirements. Consider merging many of them under one rule number.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2450 Energy storage and supply system lightning protection p. 42

comment	*106* comment by: *Textron Aviation* **CS-23.2450 Energy storage and supply system lightning protection** For aeroplanes <u>where the exposure to lightning is likely</u>, the energy storage and supply system is designed and arranged to prevent catastrophic events due to lightning strikes taking into account direct and indirect effects. Previous A-NPA language in CS 23.540 limited this requirement to level 2, 3, and 4 aircraft. The rule language from the A-NPA was far superior and did not broaden the regulatory scope and burden. In addition there should be an attempt to not use the word "likely" as it is open to interpretation.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2455 Energy transfer p. 42

comment	*35* comment by: *GE Aviation* Fuel return or motive fuel flow between the engine and the fuel supply line could be

	interpreted as a loss of stored energy. Suggest "loss of *available* stored energy"
response	

comment	*107* comment by: *Textron Aviation* **CS-23.2455 Energy transfer** With such high level rule language we are not sure how this requirement justifies it own rule. In addition fuel return or motive fuel flow between the engine and the fuel supply line could be seen as a loss of stored engine by someone who want to be augmentative. There are too many energy specific requirements. Consider merging many of them under one rule number.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2460 Energy storage p. 42

comment	*36* comment by: *GE Aviation* The intended minimum requirement expected of all technologies should be clear within the rule. (in this case, 30 minutes at MCP) <u>Proposed Language -</u> The energy storage system must accommodate <u>the amount of energy necessary for 30 minutes of safe operation at maximum continuous power.</u>
response	

comment	*108* comment by: *Textron Aviation* **CS-23.2460 Energy storage** The energy storage system must accommodate at least such a minimum amount of energy necessary for safe operation. Does this really justify its own rule? Why wouldn't the min. requirement be defined here (30 minutes at MCP) rather pushing it down into the standard. This is a min requirement that should be expected of all technologies. <u>Proposed Language -</u> The energy storage system must accommodate <u>the amount of energy necessary for 30 minutes of safe operation at maximum continuous power.</u>
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2465 Energy storage and supply systems installation p. 42-43

comment *37* comment by: *GE Aviation*

CS-23.2465 Energy storage and supply systems installation
The requirements of (a) (1) and (a) (3) appear to be duplicated.

The requirements of (a) (4) significantly increase the regulatory requirement for having redundant fuel pumps under all operating conditions for single engine piston aircraft which currently do not require a backup pump if one of the pumps is driven by the engine. Also need to avoid the word "likely".

Suggest using the rule language developed by industry and the regulators during the ARC.

response

comment *109* comment by: *Textron Aviation*

CS-23.2465 Energy storage and supply systems installation

The requirements of (a) (1) and (a) (3) appear to be duplicated.

The requirements of (a) (4) significantly increase the regulatory requirement for having redundant fuel pumps under all operating conditions for single engine piston aircraft which currently do not require a backup pump if one of the pumps is driven by the engine. Also need to avoid the word "likely".

In requirement (b) the word "omissions" doesn't seem like the right word here. "errors" would seem to encompass any sort of mistake that could lead to a loss of stored energy (e.g spilling fuel or draining batteries), not just things that are forgotten.

Is this rule intended to address the loss of fuel only or a case where someone accidently drains their batteries? Hazards due to electricity?

Keeping in mind the engine drive fuel pumps on piston engine aircraft currently are not required to be backed up.

Suggest using the rule language develop by industry and the regulators during the ARC.

response

comment *215* comment by: *DAHER*

a) The term "likely" is not quantified, which could lead to disagreements on the interpretation without the kind of statement EASA provides in blue text. Such statement should be kept in final rule. Moreover, it is essential that the AMC set the acceptable design standards, as mentioned in NPA.

(a)(2) The commentator needs clarification on the wording "Unintended temperature influence»

(4) "In case of a likely component failure»: too general compared to NPRM requirement it intends to replace (fuel filter clogging).”Likely" needs to be defined in this case: to be replaced by "probable»?

response

comment *296* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA - CS-23.2465(a)- Please clarify the expectations of preventing “unintended temperature influence”. Perhaps it would be more appropriate to indicate that “probable” component failures need to be considered in place of “likely”. The current rule addresses issues such as clogged fuel filters.

response

CS-23 — SUBPART E — POWERPLANT — CS-23.2470 Energy medium pollution within storage and supply system p. 43

comment *38* comment by: *GE Aviation*

The intent and origin of the rule is unclear. If the rule derives from requirements to filter fuel; the current wording has broadened the scope beyond capability for compliance. The rule on fuel filtration placed limits on the degree of contamination and the duration for expected operation; these minimum requirements should appear in the rule rather than in supporting external documents

Consider phrasing like “There must be provision to make stored energy suitable for use by the engine . “

response

comment *111* comment by: *Textron Aviation*

CS-23.2470 Energy medium pollution within storage and supply system

Positive separation and possibility of removal of energy medium pollution must be provided prior to any use of the energy medium if required for proper function.

The use of the word "pollution" in this language is objectionable for a number of obvious reasons. Perhaps a word such as "waste" or "excess" would be better.

response

comment *297* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: Energy medium pollution within storage and supply system: The term pollution has confusion connotations when it comes to propulsion. We recommend the

	term “waste” be used in place of this term.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2475 Energy storage filling/charging p. 43

comment	*112* comment by: *Textron Aviation* **CS-23.2475 Energy storage refill/recharge** Fix grammatical errors as shown. (a) Filling/charging points must be designed to avoid ~~wrong~~ improper filling or charging (b) ~~They~~ Filling/charging points must be designed to reasonably avoid the possibility of contamination of the energy stored during likely operation
response	

comment	*298* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: Grammatical errors in (a) and (b) should be addressed.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2480 Energy dump systems p. 43

comment	*113* comment by: *Textron Aviation* **CS-23.2480 Energy dump systems** Language may be miss-interpreted to require fuel drains with multiple redundancy to avoid failures. This would increase the regulatory burden to the current requirements. Energy dump systems must be free from hazards to the aircraft or its operation, considering any probable ~~single~~ malfunction under likely operating conditions.
response	

comment	*299* comment by: *General Aviation Manufacturers Association (GAMA)* On behalf of ASD & GAMA: This rule as written may be construed to require redundancy in fuel drains. The word “single” should be removed from “probable ~~**single**~~ malfunction”.
response	

CS-23 — SUBPART E — POWERPLANT — CS-23.2485 Powerplant information p. 43-44

comment	*18* comment by: *René Meier, Europe Air Sports* page 43/53 CS-23.2485 Proposal to change title/text from "powerplant information" to "propulsion system information" Rationale: In order to be consistent with our other comments as regards "powerplant" and "propulsion".
response	

comment	*110* comment by: *Textron Aviation* **CS-23.2485 Powerplant information** This appears to have a great deal of overlap with requirements for all systems (e.g. 23.2610, 23.2620, 23.2625. 23.2630); does having it here mean powerplants are excluded from the general case? What if there is a conflict? Consider including here only the specific engine items not already identified for all systems. **CS-23.2485 Powerplant information** (a) As currently written, this is not a requirement, rather it is a statement. As re-written in the proposed text it is a requirement. Also clarified where the information needs to go. The second requirement is redundant with proposed 23.2425 (b) and as such should be deleted. In addition as it is currently written, this is not a requirement, rather it is a statement. As re-written in the proposed text it is a requirement. (a) The following powerplant information ~~is~~ must be established and included in the airplane flight manual: ~~(6) techniques and associated limitations for engine starting and stopping; and~~ (b) Unless failure of an automatic thrust or drag augmentation system is 'Extremely Remote', information related to the availability of the system ~~is~~ must be provided
response	

CS-23 — SUBPART F — SYSTEMS AND EQUIPMENT — CS-23.2500 General requirements on systems and equipment function p. 44

comment	*51* comment by: *UK CAA* **Page No:** 44-48

Paragraph No: Subpart F Systems and Equipment – Omission of EMC.

Comment: In conjunction with the need to ensure that equipment and systems perform their intended function, it is necessary to ensure that equipment performs correctly in the presence of other aircraft systems, and therefore demonstrate electromagnetic compatibility (EMC). This is usually performed in conjunction with the relevant requirements, such as CS-23 Amendment 4 paragraph 1351(b) or 1431(b). The scope of these is no longer included in these proposals and therefore the need for aircraft systems to demonstrate electromagnetic compatibility is not addressed. Consequently, the risk of interference to required aircraft systems due to incompatibility of particular functions is not addressed.

Justification: If EMC isn't required, the risk of interference and abnormal operation due to internal electromagnetic disturbance cannot be guaranteed.

Proposed Text: Include the relevant requirement from CS-23 Amendment 4, such as paragraph 23.1431(b):

Radio and electronic equipment, controls, and wiring must be installed so that operation of any unit or system of units will not adversely affect the simultaneous operation of any other radio or electronic unit, or system of units.

response

comment *68* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)*

Subpart F – Systems and Equipment
The commentor supports the technical content of paragraphs. The commentor fully agrees with the wording proposed by the EASA.

response

comment *171* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

DGAC France suggests to add paragraph23.2550 "Systems and Equipment Information" to require specifically requirement specifying WHAT information should be established for this Subpart (refer to §23.2170)

response

comment *231* comment by: *AEROMOBIL*

Subpart F – Systems and Equipment
AEROMOBIL supports the technical content of paragraphs. AEROMOBIL fully agrees with the wording proposed by the EASA.

response

comment *254* comment by: *ELIXIR AIRCRAFT Head of Airworthiness*

Systems and Equipment

	ELIXIR AIRCRAFT supports the technical content of paragraphs. ELIXIR AIRCRAFT fully agrees with the wording proposed by the EASA.
response	

CS-23 — SUBPART F — SYSTEMS AND EQUIPMENT — CS-23.2505 Function and installation p. 44

comment	*114* comment by: *Textron Aviation* **CS-23.2505(b) Function and installation** This requirement seems out of place since there is a powerplant paragraph already dealing with accessories. Consider moving this to the powerplant section.
response	

comment	*132* comment by: *Embraer S.A.* Embraer understands that the aspects formerly covered by the CS-23.1013, CS-23.1023, CS-23.1061, CS-23.1203, CS-23.1123, CS-23.1125 and CS-23.1193 regarding vibration and load factors should be maintained and captured in the proposed CS-23.2505. Embraer suggests to include an additional section in the proposed CS-23.2505, in a more embracing way that would be applicable for any equipment, as follows: CS-23.2505 Function and installation (c) The installed equipment must be able to withstand without failure, the vibration, inertia and loads (including fluid pressure loads) to which it would be subjected in operation.
response	

CS-23 — SUBPART F — SYSTEMS AND EQUIPMENT — CS-23.2510 Equipment, systems, and installations p. 44-46

comment	*50* comment by: *UK CAA* **Page No:** 44-46 **Paragraph No:** CS-23.2510 Equipment, systems, and installations **Comment (1):** The blue explanatory text for CS-23.2510 includes a statement that: "*The terminology used in NPRM 23.1315(a) may be confusing. Indeed, NPRM 23.1315(a) does not use the terms 'catastrophic', 'hazardous' or 'major failure condition'. Instead, it uses the expressions: 'continued safe flight and landing' and 'significantly reduce the capability of the aeroplane or the ability of the flight-crew to cope with adverse operating conditions'. It is*

EASA's opinion that those expressions are not uniquely defined and it could be difficult for an applicant to link:
— the terms 'catastrophic' and 'continued safe flight and landing' ; and
— the expressions 'hazardous' and 'major' and 'significantly reduce the capability of the aeroplane or the ability of the flight-crew to cope with adverse operating conditions' expressions.
EASA is very much in favour of having those defined at rule level to avoid unnecessary and time-wasting debate."

However, the text that is then presented in the form of CS-23.2510 does not define the failure severity terms Major, Hazardous or Catastrophic, nor refer to where these can be found. They are not defined in CS-23.2000 either.

Comment (2): If it is accepted that the intent of CS-23.2510 is to be no more stringent than any other CS-xx.1309, then it is important to recall that only catastrophic, hazardous and major conditions are "required" to be demonstrated to be sufficiently unlikely at *rule* level. Minor conditions are not required by the rule to be shown to be "probable", they are allowed to be this by the AMC/AC.

However, the illustration (Figure 1) that is now presented within CS-23.2510(a)(2) now requires "by rule" that Minor and No Safety Effect failure conditions <u>are shown to be probable</u>. A definition of probable is provided within CS-23.2510(b)(4) as a condition that is anticipated to occur more times during the entire operational life of each aeroplane. This is ambiguous, but it is usually proportionately considered just more likely than "remote". It should be recalled that within AMC25.1309, "Probable" is not assigned a quantitative objective, but a nominal value of no more than one event per 1000 hours can be used in some analyses. However, this "implies" some form of qualitative assessment, and whilst what CS-23.2510(a)(2) is little different materially, it is now not only <u>requiring</u> minor conditions to demonstrate this (which might be difficult because the depth of analysis stated within "current AMC" does not promote the need for use of the "SSA" for minor failure conditions) yet Figure 1 is implying that this also be demonstrated for those conditions that were classified as No Safety Effect. This is thought to be disproportionate.

Justification: The requirement text does not fulfil the stated ambition of the explanatory text and results in requirements that are disproportionate.

Proposed Text: A revision to the section is needed as described above.

response

comment *115* comment by: *Textron Aviation*

CS-23.2510 Equipment, systems, and installation

The objectives listed in section 2.2 include: "developing cost-efficient rules in terms of certification process and harmonization"; this rule as proposed reads like it will result in the cost and complexity of certification for system safety being the same as it has been (as in concept it reads very similar to existing 2X.1309 and 25.1709 rules). How does this meet the objective?

Consider a more tiered approach to system safety that recognizes the inherent safety of simple, mature systems and alleviates certification efforts for such systems. Focus on robustness of design, testing and independence of function rather than development assurance processes and generation of paper analysis.

CS-23.2510 Equipment, systems and installations

The EASA commentary (in blue italics) on page 45 laments the lack of definition for:
'catastrophic' and 'continued safe flight and landing'
And
'hazardous' and 'major' and 'significantly reduce the capability of the aeroplane or the ability of the flight-crew to cope with adverse operating conditions' expressions
Yet, CS-23.2510 paragraph (b) is added and differs from the NPRM by providing definitions which do not include the terminology mentioned in the EASA commentary.Add these definitions for Catastrophic and Hazardous/Major to CS-23.2510 paragraph (b)(1), (2) and (3) as applicable
CS-23.2510(b) Equipment, systems and installations

I'm very concerned about putting the requirements for probable (minor), remote (major), extremely remote (hazardous) and extremely improbable (catastrophic) in the actual rule. They (the FAA) tried this on the Part 23 jet rule and we were able to get it stopped.

In the jet rule proposal, the FAA tried to put the quantitative requirements in the rule, it was no longer "on the order of". So a value of 1.001e-9 per flight hour supporting a catastrophic was a "hard" non-compliance.

While the EASA proposal "just" deals with the qualitative targets, the results could be the same.

How does an applicant show compliance to these qualitative "rules"? A way would be a follows. You have a failure condition that is major, but the major feeds up into a catastrophic tree. During the discussion with the regulators, a discussion of how do you know if you passed the "qualitative requirements for the major" could turn into "you have a fault tree right there, but your number (2e-5 per flight hour) for the major branch doesn't support major (remote), so how can you say your qualitative analysis does?"

There are several things that have been long accepted as meeting catastrophic that don't meet the actual numerical requirement. In flight shutdown of both engines is one example.

Same is true of hazardous. The mechanical down locks for the landing gear are another. These issues come up on every program, and we work through them.

But if the rule is changed, then working through the hard non-compliances just became more difficult.

Currently, FAA AC 23.1309-1E (figure 2) states the quantitative requirements for probable (minor), remote (major), extremely remote (hazardous) and extremely improbable (catastrophic) are "on the order of".

EASA should add similar wording or clearly state these are hard quantitative targets.

Otherwise, previously certified systems with appropriate service history will be acceptable on new products.

response

comment *181* comment by: *Federal Office of Civil Aviation (FOCA), Switzerland*

Comment FOCA: The term “probable” is used in several requirements. Does the definition of "probable" given in CS-23.2510 apply across the whole CS-23? If this is the case, the first statement in 23.2510(b) should be clarified.

Furthermore, we would like to know where the quantitative safety requirements are defined?

response

comment *198* comment by: *CAA-NL*

CS-23.2510: There appears to be an inconsistency between what is explained in the "Rationale for changes considering the A-NPA and the NPRM" and the actual proposal for CS 23 text:
· the "Rationale for changes considering the A-NPA and the NPRM" explains the EASA is in favour of defining the terms "catastrophic", "hazardous" etc. at rule level, which is supported.
· The proposed CS 23 text however does not define the terms "catastrophic", "hazardous" etc. and uses the same terminology as the FAA NPRM (par. 23.1315(a)).
· In contrast, the terms "catastrophic", "hazardous" etc. are used in figure 1 but not linked (as suggested by the "Rationale for changes considering the A-NPA and the NPRM") to the "continued safe flight and landing", capabilities of the flight crew and the aeroplane.
We propose to consistently use "catastrophic", "hazardous", etc., and to add a paragraph CS-23.2510(c) defining these terms by linking them to "continued safe flight and landing", the effects on occupants and the capabilities of the flight crew and of the aeroplane.

response

comment *236* comment by: *DAHER*

(a) EASA willingness to introduce table in 2510(2) in the rule is understood. However, for consistency with 2510(b), which defines the Probability levels ("Y" axis of Figure 1), a definition of the Severity levels ("X" axis of figure 1) should be included per (b) (or an additional subsection (c))

response

comment *301* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: The proposed rule is becoming more prescriptive than the existing FAA Amdt 23-62 regulation which is contrary to the direction of all other rules. FAA 23.1309(c) at Amdt 23-62 is quite simple and straightforward and you go to the advisory material to understand what needs to be done to satisfy the requirement.

Including the table, for example, on the surface doesn't seem like it would hurt anything but it is actually potentially problematic. If the table becomes regulation then how can regulators allow policy like NORSEE that allows credit to be taken for the safety benefits of the system to reduce DAL and probability requirements for such systems? Policy cannot supersede the regulation.
It would be much better to keep the rule simple and let the ASTM (or anyone else for that matter) propose an acceptable means of compliance that included this table and the definitions contained in (b).
In the previously distributed NPA wording, there was a caveat that a reduction from the requirements in the rule may be allowed if the safety benefit can be shown. This has been removed allowing no deviation to the regulation. 2510(b) is a definition rule. Why does a definition need to be a rule. You can't comply with a definition. We believe that this definition should be in the accepted standards. If it must be included in the rule language wouldn't it be better located to CS 23.2000?

response

comment *302* comment by: *General Aviation Manufacturers Association (GAMA)*

On Behalf of ASD & GAMA: CS-23.2510 (a) - It appears that 2510(a) is really saying that an assessment such as an FHA must be performed. As such, the term "failure" in (a)(1)(i) and (a)(1)(ii) should be failure conditions. As written, the analysis used to show compliance would be more like an FMEA than an FHA, which doesn't seem consistent with the intent.

Suggest changing 23.2510(a)(1)(i) to:
"If there are any failure conditions that would …"

Suggest changing 23.2510(a)(1)(ii) to:
"If any other failure conditions would …"

CS-23.2510 (a)(1)(i) Equipment, systems, and installations:
One of the issues that we sees with "continued safe flight and landing" is that the definition contained in CS 23.2000 allows only for some aeroplane damage. Why is aircraft damage relevant to the definition of continued safe flight and landing? With increased focus on crashworthiness, if the aeroplane is a total loss but everyone inside is alive, is it really catastrophic? Shouldn't the door be left open to taking credit for future crashworthiness improvements? Damage to the aeroplane is a commercial consideration. It is entirely possible that someone in the future could develop some crashworthy design that saves lives by intentionally damaging the aeroplane under crash landings similar to a car's crumple zone. Why wouldn't an applicant get credit for that?

Revising the definition of continued safe flight and landing as proposed in our comment to CS 23.2000(a) will solve this concern.

response

comment *303* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: CS-23.2510 (b) - 23.2510(b) is a definition. Why does a definition need to be a rule? You can't comply with a definition. This definition may be best placed in acceptable standards. If EASA believes it must remain in the rule language, then CS 23.2000

	seems like a better location.
response	

comment	*312* comment by: *Garmin International* Garmin's view is that the proposed rule is becoming more prescriptive than the existing Amdt 23-62 regulation which is contrary to the direction of all other rules. 23.1309(c) at Amdt 23-62 is quite simple and straightforward and you go to the advisory material to understand what needs to be done to satisfy the requirement. Including the table, for example, on the surface doesn't seem like it would hurt anything but it is actually potentially problematic. If the table becomes regulation then how can regulators allow policy like NORSEE that allows credit to be taken for the safety benefits of the system to reduce DAL and probability requirements for such systems? Policy cannot supersede the regulation. It would be much better to keep the rule simple and let the ASTM (or anyone else for that matter) propose an acceptable means of compliance that included this table and the definitions contained in (b). In the previously distributed NPA wording, there was a caveat that a reduction from the requirements in the rule may be allowed if the safety benefit can be shown. This has been removed allowing no deviation to the regulation.
response	

comment	*313* comment by: *Garmin International* It appears that 2510(a) is really saying that an assessment such as an FHA must be performed. As such, the term "failure" in (a)(1)(i) and (a)(1)(ii) should be failure conditions. As written, the analysis used to show compliance would be more like an FMEA than an FHA, which doesn't seem consistent with the intent. Suggest changing 23.2510(a)(1)(i) to: "If there are any failure conditions that would …" Suggest changing 23.2510(a)(1)(ii) to: "If any other failure conditions would …"
response	

comment	*314* comment by: *Garmin International* One of the issues that Garmin sees with "continued safe flight and landing" is that the

	definition contained in CS 23.2000 allows only for some aeroplane damage. Why is aircraft damage relevant to the definition of continued safe flight and landing? With increased focus on crashworthiness, if the aeroplane is a total loss but everyone inside is alive, is it really catastrophic? Shouldn't the door be left open to taking credit for future crashworthiness improvements? Damage to the aeroplane is a commercial consideration. It is entirely possible that someone in the future could develop some crashworthy design that saves lives by intentionally damaging the aeroplane under crash landings similar to a car's crumple zone. Why wouldn't an applicant get credit for that? Revising the definition of continued safe flight and landing as proposed in Garmin's comment on CS 23.2000(a) will solve this concern.
response	

comment	*315* comment by: *Garmin International* 23.2510(b) is a definition rule. Why does a definition need to be a rule? You can't comply with a definition. As noted in Garmin's general comment on CS 23.2510, this definition should be in the ASTM standard. If EASA believes it must remain in the rule language, then CS 23.2000 seems like a better location.
response	

CS-23 — SUBPART F — SYSTEMS AND EQUIPMENT — CS-23.2515 Electrical and electronic system lightning protection p. 46

comment	*116* comment by: *Textron Aviation* **CS-23.2515 Electrical and electronic system lightning protection** Use of the term "aeroplane system level function" is confusing in light of the subsequent paragraph using "system". We assume the intent is that at the aircraft level, the needed function must work through the threat but particular components or pieces of it may fail as long as they recover. Delete "system" so it reads "aeroplane level function"
response	

comment	*120* comment by: *Technify Motors GmbH* **CS-23.2515** (a) uses the phrase " Each electrical or electronic system that performs a function, the failure of which would prevent the continued safe flight and landing of the aeroplane " which is used for catastrophic events. **CS-23.2515** (b) uses the phrase " 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 " which is used for major events.

There is no paragraph for hazardous events. This means in practice, if a failure due to lightning is hazardous, test levels for catastrophic must be used.
Technify suggests to move (b) to (c) and introduce a paragraph for hazardous effects in (b).

response

comment *136* comment by: *Continental Motors, Inc.*

CS-23.2515 (a) uses the phrase " Each electrical or electronic system that performs a function, the failure of which would prevent the continued safe flight and landing of the aeroplane " which is used for catastrophic events.
CS-23.2515 (b) uses the phrase " 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 " which is used for major events.
There is no paragraph for hazardous events. This means in practice, if a failure due to lightning is hazardous, test levels for catastrophic must be used.
Continental Motors suggests moving (b) to (c) and introducing a paragraph for hazardous effects in (b).

response

comment *237* comment by: *DAHER*

(a) The commentator would propose to replace "continues to perform" by "is not adversely affected" which would be more appropriate . This wording is clearer, and is consistent with 23.2520 and previous regulation and CRIs.

Please use NPRM wording, since type of operation adequately prevents use in type of environments for which the A/C is not designed.

response

comment *304* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: Certification authorities and industry have agreed that a goal of the CS-23 reorganization is more proportionate regulatory requirements. As written, the proposed 23.2515 is essentially the same as the current 23.1306. Both the current 23.1306 and the proposed 23.2515 are overly burdensome for low end Part 23 aeroplanes.

The current 23.1306(a) rule can be interpreted to mean all systems performing the same function are required to meet lightning requirements; or, stated differently, all redundant systems performing the same function must meet the lightning requirements. There has been much debate in the industy related to this interpretation. We suggest replacement of 23.2515(a) (Catastrophic failures) and 23.2515(b) (Major and Hazardous failures) are an attempt to ensure that the requirement is at the function level only. Redundant systems performing the same function (e.g. for availability) do not need to meet the highest requirement so long as the function from any one system continues to be available or provides mitigations such that a CAT/HAZ/MAJ failure condition is prevented at the levels required for the highest failure classification (e.g. a monitor catches an erroneous operation). As an example, loss of all attitude can be CAT, so either the PFD meets the CAT requirement

	and the STBY meets a lower requirement associated with its failure OR vice versa. Similarly for a control/monitor type architecture, either the control works or the monitor works at the levels required for the highest failure classification. The proposed 23.2515 should be revised to be more generic and let the ASTM standards provide the necessary compliance means. If proposed 23.2515 is not revised to be more generic at its introduction, it will be much harder to change at a later date through the amendment process. Additionally, since EASA's proposed 23.2515 is essentially unchanged from the current 23.1306, it can be interpreted the same with regards to how it is applied today. Thus, there is no perceived relief in the proposed 23.2515. The proposed 23.2515 should be revised to be focused on preventing CAT/HAZ/MAJ failure conditions at the aeroplane level in a similar manner to how other areas of system safety is achieved, e.g. budgeting of Design Assurance Levels (DAL) across system architecture such that a function meets the desired safety goals and not requiring all redundant systems providing the same function to meet the highest requirements. This is what our suggested resolution focuses on for 23.2515(a). For 23.2515(b), the requirement for MAJ and HAZ functions should be limited to aircraft with higher performance alleviating the burden on lower P23 class aircraft, given that they do not encounter lightning as often due to their typical flight time being lower than a higher performance aircraft. We propose the following replacement for 23.2515 that will help address the issues identified in our Comment with additional guidance developed in the ASTM standard: "§ 23.2515 Electrical and electronic system lightning protection. (a) Electrical or electronic systems 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 the function is not adversely affected during and after the time the aeroplane is exposed to lightning. (b) For level 3 and 4 aeroplanes approved for IFR operations, electrical and electronic systems that perform a function, the failure of which would reduce the capability of the aeroplane or the ability of the flightcrew to respond to an adverse operating condition, must be designed and installed such that the function recovers normal operation in a timely manner after the aeroplane is exposed to lightning." With the proposed revision to 23.2515, the ASTM standard can then provide: 1) A tiered compliance approach for different aeroplane certification levels per proposed 23.2005, and 2) Additional guidance in meeting the intent of the rule. CS-23.2515(a) Electrical and electronic system lightning protection: The terminology "continues to perform" should be clarified in guidance material to assure the specific meaning is understood.
response	

comment *316* comment by: *Garmin International*

Both certification authorities and industry have agreed that a goal of the Part 23 reorganization is more proportionate regulatory requirements. As written, the proposed 23.2515 is essentially the same as the current 23.1306. Both the current 23.1306 and the proposed 23.2515 are overly burdensome for low end Part 23 aeroplanes.

The current 23.1306(a) rule can be interpreted to mean all systems performing the same function are required to meet lightning requirements; or, stated differently, all redundant systems performing the same function must meet the lightning requirements. There has been much debate in the GAMA AVI lightning/HIRF ad-hoc meetings related to this interpretation. Garmin's suggested replacement 23.2515(a) (Catastrophic failures) and 23.2515(b) (Major and Hazardous failures) are an attempt to ensure that the requirement is at the function level only. Redundant systems performing the same function (e.g. for availability) do not need to meet the highest requirement so long as the function from any **one system** continues to be available or provides mitigations such that a CAT/HAZ/MAJ failure condition is prevented at the levels required for the highest failure classification (e.g. a monitor catches an erroneous operation). As an example, loss of all attitude can be CAT, so either the PFD meets the CAT requirement and the STBY meets a lower requirement associated with its failure OR vice versa. Similarly for a control/monitor type architecture, either the control works or the monitor works at the levels required for the highest failure classification.

The proposed 23.2515 should be revised to be more generic and let the ASTM standards provide the necessary compliance means. If proposed 23.2515 is not revised to be more generic at its introduction, it will be much harder to change at a later date through the amendment process.

Additionally, since EASA's proposed 23.2515 is essentially unchanged from the current 23.1306, it can be interpreted the same with regards to how it is applied today. Thus, there is no perceived relief in the proposed 23.2515.

The proposed 23.2515 should be revised to be focused on preventing CAT/HAZ/MAJ failure conditions at the aeroplane level in a similar manner to how other areas of system safety is achieved, e.g. budgeting of Design Assurance Levels (DAL) across system architecture such that a function meets the desired safety goals and not requiring **all** redundant systems providing the same function to meet the highest requirements. This is what Garmin's Suggested Resolution focuses on for 23.2515(a).

For 23.2515(b), the requirement for MAJ and HAZ functions should be limited to aircraft with higher performance alleviating the burden on lower P23 class aircraft, given that they do not encounter lightning as often due to their typical flight time being lower than a higher performance aircraft.

Garmin proposes the following replacement for 23.2515 that will help address the issues identified in our Comment with additional guidance developed in the ASTM standard:

"§ 23.2515 Electrical and electronic system lightning protection.

(a) Electrical or electronic systems 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 the function is not adversely affected during and after the time the aeroplane is exposed to lightning.

(b) For level 3 and 4 aeroplanes approved for IFR operations, electrical and electronic systems that perform a function, the failure of which would reduce the capability of the aeroplane or the ability of the flightcrew to respond to an adverse operating condition, must be designed and installed such that the function recovers normal operation in a timely manner after the aeroplane is exposed to lightning."

With the Garmin proposed revision to 23.2515, the ASTM standard can then provide:

1) A tiered compliance approach for different aeroplane certification levels per proposed 23.2005, and

2) Additional guidance in meeting the intent of the rule.

response

CS-23 — SUBPART F — SYSTEMS AND EQUIPMENT — CS-23.2520 High-intensity radiated fields (HIRF) protection p. 46-47

comment *52* comment by: *UK CAA*

Page No: 46-47

Paragraph No: CS-23.2520 High-intensity radiated fields (HIRF) protection

Comment: The HIRF requirements of CS-23.2520 refer to aeroplane functions not being adversely affected when exposed to the HIRF environment. Yet a HIRF environment isn't defined or included within the CS. There are currently two HIRF environments for fixed-wing aircraft that need to be assessed in conjunction with each other to apply to CRITICAL aircraft functions or aircraft systems (see CS23.1308, Amdt 4). The change as presented is seen to focus on only system function and not consider the performance of all systems that perform the function; essential functions (Hazardous and Major failure conditions) are also not seen to be addressed anymore. This therefore departs from the universally harmonised approach for fixed and rotary wing HIRF compliance.

Justification: The requirement does not consider the lower-level of HIRF compliance for "each" system performing critical functions and has omitted the need to consider essential function systems that need to be HIRF compliant to a degree proportional to the hazard severity.

The HIRF environment does not discriminate between types of aircraft. The requirements have been harmonised for several decades and are applied in a proportionate manner dependent on the severity of any associated hazard. If aircraft can be considered to not suffer any catastrophic or hazardous or major failures then compliance would not of course be necessary, but if failures of such severity are possible then protection against the expected environment should be provided.

By not including full compliance with the completely defined HIRF environment(s) would render any approach to compliance with CS-23.2500(a)(2) as incomplete. HIRF is part of the environment.

Proposed Text: New texts, from CS-23.1308 Amdt 4, should be developed to: re-align requirements for Critical and Essential systems with defined HIRF environments; provide definition of HIRF environments; and define proportionate response for HIRF compliance for essential systems.

response

comment *117* comment by: *Textron Aviation*

CS-23.2520 High-intensity radiated fields (HIRF) protection

Use of the term “aeroplane system level function” is confusing in light of the subsequent paragraph using “system”. We assume the intent is that at the aircraft level, the needed function must work through the threat but particular components or pieces of it may fail as long as they recover.

Delete “system” so it reads “aeroplane level function”

response

comment *121* comment by: *Technify Motors GmbH*

CS-23.2520 (a) uses the phrase " Electrical and electronic systems that perform a function, the failure of which would prevent the continued safe flight and landing of the aeroplane " which is used for catastrophic events.
CS-23.2520 (b) uses the phrase " 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 " which is used for major events.
There is no paragrahp for hazardous events. This means in practice, if a failure due to HIRF is hazardous, test levels for catastrophic must be used.
Technify suggests to move (b) to (c) and introduce a paragraph for hazardous effects in (b).

response

comment *133* comment by: *Embraer S.A.*

Embraer suggests to EASA to adopt the same HIRF environments and test levels described on current CS-23 Appendix K, associated to the current requirement CS-23.1308.

response

comment *137* comment by: *Continental Motors, Inc.*

CS-23.2520 (a) uses the phrase " Electrical and electronic systems that perform a function, the failure of which would prevent the continued safe flight and landing of the aeroplane " which is used for catastrophic events.

CS-23.2520 (b) uses the phrase " 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 " which is used for major events.
There is no paragraph for hazardous events. This means in practice, if a failure due to HIRF is hazardous, test levels for catastrophic must be used.
Continental Motors suggests moving (b) to (c) and introducing a paragraph for hazardous effects in (b).

response

comment *305* comment by: *General Aviation Manufacturers Association (GAMA)*

On behalf of ASD & GAMA: Certification authorities and industry have agreed that a goal of the CS-23 reorganization is more proportionate regulatory requirements. As written, the proposed 23.2520 is essentially the same as the current 23.1308. Both the current 23.1308 and the proposed 23.2520 are overly burdensome for low end CS-23 aircraft.

The current 23.1308 rule can be interpreted to mean all systems performing the same function are required to meet HIRF requirements; or, stated differently, all redundant systems performing the same function must meet the HIRF requirements. There has been much debate in industry related to this interpretation. We suggest replacement 23.2520(a) (Catastrophic failures) and 23.2520(b) (Major and Hazardous failures) are an attempt to ensure that the requirement is at the function level only. Redundant systems performing the same function (e.g. for availability) do not need to meet the highest requirement so long as the function from any one system continues to be available or provides mitigations such that a CAT/HAZ/MAJ failure condition is prevented at the levels required for the highest failure classification (e.g. a monitor catches an erroneous operation). As an example, loss of all attitude can be CAT, so either the PFD meets the CAT requirement and the STBY meets a lower requirement associated with its failure OR vice versa. Similarly for a control/monitor type architecture, either the control works or the monitor works at the levels required for the highest failure classification.

The proposed 23.2520 should be revised to be more generic and let the ASTM standards provide the necessary compliance means. If proposed 23.2520 is not revised to be more generic at its introduction, it will be much harder to change at a later date through the amendment process.

The proposed 23.2520 should be revised to be focused on preventing CAT/HAZ/MAJ failure conditions at the aeroplane level in a similar manner to how other areas of system safety is achieved, e.g. budgeting of Design Assurance Levels (DAL) across system architecture such that a function meets the desired safety goals and not requiring all redundant systems providing the same function to meet the highest requirements. This is what our suggested resolution focuses on for 23.2520(a).

For 23.2520(b), the requirement for MAJ and HAZ functions should be limited to aircraft with higher performance alleviating the burden on lower P23 class aircraft. There are significant number of hours in the field without HIRF issues with small aircraft that have systems with no HIRF qualifications as well as systems with low HIRF qualifications, e.g. 5V/m & 150V/m that is required by the current regulations for systems with Major & Hazardous functions. The expected level of HIRF can be as high as 750V/m (pulsed) when considering the typical

12dB attenuation allowed by ED-107 Section 6.5 & AC20-158A Appendix 1 Section 2.b.(3) for the cockpit environment. This level is orders of magnitude higher than what most systems on low end aircraft is qualified to and yet there does not seem to be issues related to HIRF.
We propose the following replacement for 23.2520 that will help address the issues identified in our Comment with additional guidance developed in the ASTM standard:

§ 23.2520 High-intensity Radiated Fields (HIRF) Protection.
(a) Electrical or electronic systems 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 the function is not adversely affected during and after the time the aeroplane is exposed to the HIRF environment.

(b) For level 3 and 4 aeroplanes approved for IFR operations, electrical and electronic systems that perform a function, the failure of which would reduce the capability of the aeroplane or the ability of the flightcrew to respond to an adverse operating condition, must be designed and installed such that the function recovers normal operation in a timely manner after the aeroplane is exposed to the HIRF environment.

With the proposed revision to 23.2520, the ASTM standard can then provide:

1) A tiered compliance approach for different aeroplane certification levels per proposed 23.2005, and
2) Additional guidance in meeting the intent of the rule.

CS-23.2610 Flight, navigation, and power plant instruments:
What is meant by the term “trends”?

response

comment *317* comment by: *Garmin International*

Both certification authorities and industry have agreed that a goal of the Part 23 reorganization is more proportionate regulatory requirements. As written, the proposed 23.2520 is essentially the same as the current 23.1308. Both the current 23.1308 and the proposed 23.2520 are overly burdensome for low end Part 23 aircraft.

The current 23.1308 rule can be interpreted to mean all systems performing the same function are required to meet HIRF requirements; or, stated differently, all redundant systems performing the same function must meet the HIRF requirements. There has been much debate in the GAMA AVI lightning/HIRF ad-hoc meetings related to this interpretation. Garmin’s suggested replacement 23.2520(a) (Catastrophic failures) and 23.2520(b) (Major and Hazardous failures) are an attempt to ensure that the requirement is at the function level only. Redundant systems performing the same function (e.g. for availability) do not need to meet the highest requirement so long as the function from any **one system** continues to be available or provides mitigations such that a CAT/HAZ/MAJ failure condition is prevented at the levels required for the highest failure classification (e.g. a monitor catches an erroneous operation). As an example, loss of all attitude can be CAT, so either the PFD meets the CAT requirement and the STBY meets a lower requirement associated with its failure OR vice versa. Similarly for a control/monitor type architecture, either the control works or the monitor works at the levels required for the highest failure

classification.

The proposed 23.2520 should be revised to be more generic and let the ASTM standards provide the necessary compliance means. If proposed 23.2520 is not revised to be more generic at its introduction, it will be much harder to change at a later date through the amendment process.

The proposed 23.2520 should be revised to be focused on preventing CAT/HAZ/MAJ failure conditions at the aeroplane level in a similar manner to how other areas of system safety is achieved, e.g. budgeting of Design Assurance Levels (DAL) across system architecture such that a function meets the desired safety goals and not requiring **all** redundant systems providing the same function to meet the highest requirements. This is what Garmin's Suggested Resolution focuses on for 23.2520(a).

For 23.2520(b), the requirement for MAJ and HAZ functions should be limited to aircraft with higher performance alleviating the burden on lower P23 class aircraft. There are significant number of hours in the field without HIRF issues with small aircraft that have systems with no HIRF qualifications as well as systems with low HIRF qualifications, e.g. 5V/m & 150V/m that is required by the current regulations for systems with Major & Hazardous functions. The expected level of HIRF can be as high as 750V/m (pulsed) when considering the typical 12dB attenuation allowed by ED-107 Section 6.5 & AC20-158A Appendix 1 Section 2.b.(3) for the cockpit environment. This level is orders of magnitude higher than what most systems on low end aircraft is qualified to and yet there does not seem to be issues related to HIRF.

Garmin proposes the following replacement for 23.2520 that will help address the issues identified in our Comment with additional guidance developed in the ASTM standard:

§ 23.2520 High-intensity Radiated Fields (HIRF) Protection.

(a) Electrical or electronic systems 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 the function is not adversely affected during and after the time the aeroplane is exposed to the HIRF environment.

(b) For level 3 and 4 aeroplanes approved for IFR operations, electrical and electronic systems that perform a function, the failure of which would reduce the capability of the aeroplane or the ability of the flightcrew to respond to an adverse operating condition, must be designed and installed such that the function recovers normal operation in a timely manner after the aeroplane is exposed to the HIRF environment.

With the Garmin proposed revision to 23.2520, the ASTM standard can then provide:

1) A tiered compliance approach for different aeroplane certification levels per proposed 23.2005, and

2) Additional guidance in meeting the intent of the rule.

response

CS-23 — SUBPART F — SYSTEMS AND EQUIPMENT — CS-23.2525 System power generation, storage, and distribution p. 47

comment *118* comment by: *Textron Aviation*

CS-23.2525(a) System power generation, storage and distribution

The requirement to supply power during all "likely" operating conditions could easily be extended to conditions well beyond the intended and designed operating environment and has no reasonable boundary for demonstrating compliance.

recommend changing the sentence wording from"...connected loads during all likely operating conditions" to "…connected loads during all intended operating conditions" so that it matches the CS23.630 APNA wording. This will provide a clear boundary for demonstration of compliance

CS-23.2525(b) Landing gear systems

As written the requirement applies to all systems including those powered by hydraulic or pneumatic power sources. For systems like hydraulic landing gear where there are single faults that can disable the hydraulic power source that are considered acceptable due to the use of cable release or pneumatic systems for extending the gear. The existing wording does not make allowance for those types of mitigation of single faults

Recommend adding additional wording to allow for alternate means to operate or configure the system to a condition that will allow continued safe flight and landing if a single fault will prevent the power soured from supplying the essential loads.

response

comment *134* comment by: *Embraer S.A.*

Embraer suggests to rephrase the paragraph CS-23.2525 (c) to harmonize with the proposed FAA NPRM 14 CFR Part 23 - §23.1330 (c), as follows:

CS-23.2525 System power generation, storage, and distribution.

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

(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.~~:

(1) At least 30 minutes for airplanes certificated with a maximum altitude of 25,000 feet

	(7,620 meters) or less; or (2) At least 60 minutes for airplanes certificated with a maximum altitude over 25,000 feet (7,620 meters).
response	

CS-23 — SUBPART F — SYSTEMS AND EQUIPMENT — CS-23.2530 External and cockpit lighting p. 47-48

comment	*135* comment by: *Embraer S.A.* Embraer suggests to adopt guidance material and standards (e.g. AC and ARP), as reference to the certification project, provided these documents (e.g. AC and ARP) be compatible with the current CS-23 requirements.
response	

CS-23 — SUBPART F — SYSTEMS AND EQUIPMENT — CS-23.2545 Installation of recorders (e.g.cockpit voice recorders and flight data recorders) p. 48

comment	*119* comment by: *Textron Aviation* **CS-23.2545 Installation of recorders (e.g. cockpit voice recorders and flight data recorders)** This is a valuable and needed rewording of the requirements for recorders. Thank you for making the requirement design independent.
response	

CS-23 — SUBPART G — FLIGHT CREW INTERFACE AND OTHER INFORMATION — CS-23.2600 Flight crew compartment p. 49

comment	*72* comment by: *Hugues LE CARDINAL (Chairman of VELICA SAS)* **Subpart G – Flight crew interface and other Information** The commentor would recommends CS-23.2170 “Operating limitations" would be included in the subpart G at it has always been. We see no advantage having the “Operating limitations “ alone at their proposed place.
response	

comment	*230* comment by: *AEROMOBIL* **Subpart G – Flight crew interface and other Information** AEROMOBIL would recommends CS-23.2170 “Operating limitations would be included in the subpart G at it has always been. We see no advantage having the “Operating limitations “ alone at their proposed place.
response	

comment	*255* comment by: *ELIXIR AIRCRAFT Head of Airworthiness* **Flight crew interface and other Information** ELIXIR AIRCRAFT would recommend CS-23.2170 “Operating limitations would be included in the subpart G at it has always been. We see no advantage having the “Operating limitations “ alone at their proposed place.
response	

CS-23 — SUBPART G — FLIGHT CREW INTERFACE AND OTHER INFORMATION — CS-23.2605 Installation and operation information p. 49

comment	*191* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* (c) is duplicated with CS-23.2620 (d), and found to be more suitable in CS-23.2620 (d). Consider removing from this paragraph. Language style is not consistent with Subpart G.
response	

CS-23 — SUBPART G — FLIGHT CREW INTERFACE AND OTHER INFORMATION — CS-23.2610 Flight, navigation, and powerplant instruments p. 49-50

comment	*19* comment by: *René Meier, Europe Air Sports* page 49/53 CS-23.2610 Proposal to change title/text from ".....powerplant instruments" to "propulsion system instruments" Rationale: In order to be consistent with our other comments as regards "powerplant" and "propulsion".
response	

comment	*238* comment by: *DAHER* What is the exact meaning of the word "trends"?
response	

CS-23 — SUBPART G — FLIGHT CREW INTERFACE AND OTHER INFORMATION — CS-23.2620 Instrument markings, control markings, and placards p. 50-51

comment	*20* comment by: *René Meier, Europe Air Sports* page 50/53 CS-23.2620

Please replacle "airplane" by "aeroplane" as used in the other parts of this NPA.

Rationale:
For consistency reasons.

response

comment *192* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH*

(d) Language style is not consistent with Subpart G.

response

CS-23 — SUBPART G — FLIGHT CREW INTERFACE AND OTHER INFORMATION — CS-23.2625 Aeroplane flight manual p. 51

comment *53* comment by: *UK CAA*

Page No: 51

Paragraph No: CS-23.2625 Aeroplane flight manual

Comment: Because of the wide range of types covered by CS-23 it needs to be recognised that the operating rules which will be applicable to them will also vary widely. Consequently, it would be more efficient and therefore beneficial if CS-23.2625 included an all-encompassing requirement to include the performance information required by the applicable operating rules.

The AFM must contain information required by CS-23.1583, CS-23.1589, other information necessary for safe operation and information necessary to comply with the operating rules

Proposed Text: Amend to read:

(a) The applicant must provide an Aeroplane Flight Manual that must be delivered with each aeroplane that contains the following information:

(1) Operating limitations and procedures;
(2) Performance information;
(3) Loading information;
(4) Instrument marking and placard information; and
(5) Any other information necessary for the safe operation of the aeroplane, **and performance information necessary to comply with the applicable operating rules**.

response

comment *172* comment by: *DGAC Deputy Head of aircraft and operations rulemaking department*

23.2625(1):
DGAC France suggests the following alternative wording :

	"*(1) Operating limitations, normal and emergency procedures*"
response	

CS-23 — SUBPART G — FLIGHT CREW INTERFACE AND OTHER INFORMATION — CS-23.2630 Instructions for continued airworthiness (ICA) p. 51-52

comment	*21* comment by: *René Meier, Europe Air Sports* page 51/53 CS-23.2630 Instructions for continued airworthiness (ICA) Peanut: The text of (a), (b), (c), (d) could be shortened a little bit by always using the abbreviation "ICA" which is presented behind the full text title. Rationale: Could be a standard solution.
response	

comment	*193* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* (d) The first sentence is repeated from CS-23.2255 (a) , consider removing the first sentence.
response	

6. AMC to CS-23 — AMC 23.1 Purpose and scope p. 53

comment	*54* comment by: *UK CAA* **Page No:** 53 **Paragraph No:** 6 AMC to CS-23 **Comment**: It appears from the proposals that applicants will be able to use a mixture of the AMC for the aircraft type in question, e.g. CS-23 and associated AMC No. 1 plus No. 3 ASTM, or CS-VLA and associated AMC No. 2 plus No. 3 ASTM. **Justification:** This is undesirable because choosing specific individual requirement paragraphs across the available AMC options means a potential “mix and match” lower compliance standard could be achieved.
response	

comment	*55* comment by: *UK CAA* **Page No:** 53 **Paragraph No:** 6 AMC to CS-23

Comment: It is unclear whether EASA and FAA will maintain a watch on ASTM activity to ensure that a non-standardised series of compliance approaches does not develop. In any case, this needs to be addressed Nevertheless, raising a CRI for novel/unusual features would still seem a faster route than waiting for the development of new ASTM standard material.

Justification: Clarification required.

response

comment *261* comment by: *CAA CZ*

Is it acceptable to combine two or more AMCs (accepted by EASA) in scope of one certification basic? For example: Can a combination of AMC 1 and AMC 3 be proposed for a new aeroplane TC (e.g. AMC 1 be used for Structures and AMC 3 for Equipment)?

response

comment *263* comment by: *CAA CZ*

Section 6 (AMC to CS-23) should define references between requirements of CS-23 amdt. 5 and particular AMC. It should be specified for each requirement in new CS-23 which point(s) from AMC (e.g. AMC 3 = AMST standards) are mandatory to comply with. Good example is „Appendix 1 to the Preamble - Current to Proposed Regulations Cross-Reference Table“ of the FAA NPRM which contains a cross-reference table for CS-23 Amdt.4/Amdt. 5.

response

6. AMC to CS-23 — AMC No 1 to CS-23(CS-23—Amendment 4) p. 53

comment *186* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH*

Our understanding is that the new CS-23.2145 will apply and new AMC will be provided/accepted. This should be noted as an exception to the acceptance of CS-23/4.

response

6. AMC to CS-23 — AMC No 2 to CS-23 (CS-VLA Amendment 1) p. 53

comment *187* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH*

Our understanding is that the new CS-23.2145 will apply and new AMC will be provided/accepted. This should be noted as an exception to the acceptance of CS-VLA/1.

response

6. AMC to CS-23 — AMC No 3 to CS-23 (ASTM Consensus standards) p. 53

comment	*143* comment by: *Robert Kremnitzer / Diamond Aircraft Industries GmbH* The list of accepted standards shall be a public document. The list published as an individual document, that can be maintained, updated and exported to various file formats easily is preferred. The goal should be to accept standard documents as a whole, without restrictions and conditions.
response	

comment	*199* comment by: *CAA-NL* The proposal focuses for the content of Book 2 (the new AMC to CS-23) on the products of ASTM F44. We would like to point out that in particular in the domain of system development and safety assurance of systems, there are a number of industry consensus standards that we consider equally suitable as part of the AMC. In our opinion the following documents should be included in the AMC material for Subpart F of the new proposed SC-23, as part of the Airworthiness Design Standards: · EUROCAE ED-79A / SAE ARP 4754A, “Guidelines for Development of Civil Aircraft and Systems”; · EUROCAE ED-135 / SAE ARP 4761,” Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment”; · EUROCAE ED-12C / RTCA DO-178C, “Software Considerations in Airborne Systems and Equipment Certification”; and: · EUROCAE ED-80 / RTCA DO-254, “Design Assurance Guidance for Airborne Electronic Hardware”.
response	