European Aviation Safety Agency

Notice of Proposed Amendment 2016-05

Reorganisation of CS-23

(Related to US NPRM 16-01 'Revision of Airworthiness Standards Part 23')

RMT.0498 — 23.6.2016

EXECUTIVE SUMMARY

This Notice of Proposed Amendment (NPA) proposes a reorganisation of Certification Specifications 'CS-23' — Certification Specifications for Normal, Utility, Aerobatic, and Commuter Category Aeroplanes.

Through this reorganisation of the current CS-23, a new concept will be introduced. The European Aviation Safety Agency (EASA) certification specifications will be replaced by objective requirements that are design-independent. These objective requirements, due to their higher abstract level, will become also suitable for current CS-VLA aeroplanes. The proposed new CS-23 will therefore also replace CS-VLA.

Acceptable means of compliance (AMC) will capture the technical details and, when applicable, provide differentiation for the variety of aeroplane designs within the scope of CS-23 and CS-VLA. The proposed AMC in this NPA contain a set of draft consensus standards that EASA proposes to accept to demonstrate compliance with these objective rules. It is anticipated that the use of consensus standards as AMC will allow for a faster adoption of new technologies and better up-to-date standards. This improved flexibility is intended to encourage the introduction of safety-enhancing features and reduce certification costs for these types of aeroplanes. Future amendments of these consensus standards will be subject to acceptance by EASA, following an appropriate rulemaking process.

Similar to this NPA, the Federal Aviation Administration (FAA) recently published notice of proposed rulemaking (NPRM) 16-01 for the restructuring of part 23. EASA has been observing and cooperating in this restructuring of part 23 from the early days of the Aviation Rulemaking Committee (ARC), and strongly supports the initiative that is aiming to change the airworthiness requirements in a way that supports General Aviation development and innovation. It is believed and clearly expressed by stakeholders in Europe and the US, that harmonisation of this restructuring is vital for a global success.

This NPA therefore considers the feedback that EASA received through the consultation of Advance Notice of Proposed Amendment (A-NPA) 2015-06 that explained the new concept, as well as the FAA NPRM. The proposal for the reorganised CS-23 in this NPA reflects EASA's current position that is not fully in line with the FAA NPRM. Since harmonisation is an important goal of this rulemaking activity, stakeholders' comments especially on the differences between this NPA and the FAA NPRM are appreciated.

Applicability		**Process map**	
Affected regulations and decisions:	ED Decision 2003/014/RM (CS-23): ED Decision 2003/018/RM (CS-VLA)	Concept paper:	No
		Terms of reference:	31.10.2013
		Rulemaking group:	Yes
Affected stakeholders:	General Aviation DAHs	RIA type:	Light
		Technical consultation during NPA drafting:	No
Driver/origin:	Efficiency/Proportionality	Duration of NPA consultation:	3 months
Reference:	Report from the 14 CFR Part 23 Reorganization ARC to the FAA	Review group:	Yes
		Focused consultation:	Yes
		Publication date of the decision:	2016/Q4

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1. Procedural information

1.1. The rule development procedure

EASA developed this NPA in line with Regulation (EC) No 216/2008[1] (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure[2].

This regulatory activity is included in EASA's 5-year Rulemaking Programme under RMT.0498. Although EASA anticipated a focused consultation when the ToR were published, it was decided to issue an A-NPA (A-NPA 2015-06) to seek input from stakeholders.

The text of this NPA has been developed by EASA based on:

— the input of the Rulemaking Group for RMT.0498 on the objective rules,

— the feedback received in response to A-NPA 2015-06; and

— the feedback of the ASTM International Committee F44 on General Aviation Aircraft and of the Part 23 Reorganization Aviation Rulemaking Committee (ARC).

It is hereby submitted for consultation of all interested parties[3].

This rulemaking activity is a pilot project in the rulemaking cooperation between EASA and the FAA, where both authorities in parallel have developed a proposed rule change to CS-23/CS-VLA (EASA) and part 23 (FAA). Because this rulemaking cooperation project aims at harmonisation between CS-23 and part 23, this NPA addresses EASA's proposal for CS-23 in relation to the FAA part 23 NPRM.

For efficiency reasons, this NPA refers to the FAA NPRM when possible.

The process map on the title page contains the major milestones of this rulemaking activity to date and provides an overview of the timescales of the next steps.

1.2. The structure of this NPA

This NPA is organised as followed:

1 Procedural information related to this task

2 Explanatory note

The explanatory note provides the background information to the development of this proposal. It also elaborates on the reason for proposing changes that are included to enhance safety.

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[1] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1) (http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1464170711619&uri=CELEX:32008R0216).

[2] The Agency is bound to follow a structured rulemaking process as required by Article 52(1) of the Basic Regulation. Such a process has been adopted by the Agency's Management Board (MB)and is referred to as the 'Rulemaking Procedure'. See MB Decision No 18-2015 replacing Decision 01/2012 concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material (http://www.easa.europa.eu/system/files/dfu/EASA%20MB%20Decision%2018-2015%20on%20Rulemaking%20Procedure.pdf).

[3] In accordance with Article 52 of Regulation (EC) No 216/2008 and Articles 6(3) and 7) of the Rulemaking Procedure.

The regulatory impact assessment is in general referring to the analysis of the NPRM. It additionally includes a number of questions to stakeholders to verify that this also appropriately covers the European environment.

3 Detailed rationale for the proposed EASA/FAA harmonisation issues

This chapter describes only the generic harmonisation issues between the CS-23 and part 23 proposals. All detailed comments concerning harmonisation between specific requirements are included in Chapter 5 'Performance-based requirements.'

6 AMC to CS-23

The AMC includes a hyperlink to a read access to the consensus standards that provides a technically detailed acceptable means of compliance.

1.3. How to comment on this NPA

Please submit your comments using the automated **comment-response tool (CRT)** available at **http://hub.easa.europa.eu/crt/**[4].

The deadline for submission of comments is **23 September 2016.**

In order to aid harmonisation discussions, it would be highly appreciated if substantial comments are provided as early as possible after publication of this NPA.

1.4. The next steps in the procedure

Following the closing of the NPA public consultation period, EASA will review all comments.

The outcome of the NPA public consultation will be reflected a comment-response document (CRD).

EASA will publish the CRD concurrently with the related decision.

The Decisions, based on the outcome of the NPA consultation, will contain the amendments to certification specifications (CSs) and the associated AMC and will be published on the EASA website.

[4] In case of technical problems, please contact the CRT webmaster (crt@easa.europa.eu).

2. Explanatory note

The objective of this NPA is to propose a reorganised and merged CS-VLA and CS-23 into one single CS-23 that covers the applicability of both certification specifications. In order to promote a diversity of new designs and technology, the rules are changed from prescriptive design-specific requirements into objective and performance-based ones. The technological developments should be supported by AMC that, when possible, refer to industry standards that capture the relevant details.

This reorganisation of CS-VLA and CS-23 is a concept change that is similar to the FAA proposed reorganisation of Part 23. This NPA therefore aims at harmonisation with that proposed change. From the feedback received on A-NPA 2015-06 and discussions during the development of this NPA, it is however clear that a harmonised position is not yet achieved in all proposals. *This NPA therefore focuses on the differences from the FAA NPRM* ***(highlighted by this font)****, and especially requests stakeholders to express their opinion on these issues in order to work towards full harmonisation.*

2.1. Background issue analysis: the reason for the reorganisation of CS-23

The range of aeroplanes certificated under CS-23 is diverse in terms of performance capability, number of passengers, design complexity, technology, and intended use.

Currently, each CS-23 aeroplane certification requirement is determined by reference to a combination of factors, including weight, number of passengers, and propulsion type. The resulting divisions (i.e. normal, utility, aerobatic, and commuter categories) historically were appropriate because there was a clear relationship between the propulsion and weight of the aeroplane and its associated performance and complexity.

Technological developments have altered the dynamics of that relationship. For example, high-performance and complex aeroplanes now exist within the weight range that historically was occupied by only light and simple aeroplanes. The introduction of high-performance, lightweight aeroplanes required subsequent amendments of part 23 to include more stringent and demanding standards — often based on the part 25 requirements for larger transport category aeroplanes — to ensure an adequate level of safety for aeroplanes under part 23. The unintended result is that some of the more stringent and demanding standards for high-performance aeroplanes now apply to the certification of simple and low-performance aeroplanes.

2.1.1. CS-23 history

Over the past decades and after numerous amendments, the original JAR-23 (similar to the part 23) that is the basis for the current CS-23, has evolved into a body of highly complex and prescriptive requirements attempting to codify specific design requirements, address specific problems encountered during prior certification projects, and respond to specific safety recommendations. Although the intent of the prescriptive language contained in the current CS-23 was to increase the level of safety, prevent confusion, and clarify ambiguities, the current regulations have also restrained manufacturers' ability to employ new designs and testing methodologies. EASA believes that moving towards performance-based standards should significantly reduce or eliminate barriers to innovation and facilitate the introduction of new safety-enhancing technologies.

The actual start of this initiative to change CS-23 finds its origin in a US initiative. In 2008, a US initiative started when the FAA conducted a review of part 23 by initiating the Part 23 Certification Process Study (CPS).

Collaborating with industry, the team's challenge was to determine the future of part 23, given today's current products and anticipated future products. The team identified opportunities for improvements by examining the entire life cycle of a part 23 aeroplane. The CPS recommended reorganising part 23 using criteria focused on performance and design complexity. The CPS also recommended that the FAA implement general airworthiness requirements, with the means of compliance defined in industry consensus standards. In 2010, following the publication of the Part 23 CPS, the FAA held a series of public meetings to seek feedback concerning the findings and recommendations. Overall, the feedback was supportive of, and in some cases augmented, the CPS recommendations. One notable difference between the CPS findings and the public feedback was the public's request that the FAA revise part 23 certification requirements for simple, entry-level aeroplanes. Over the past two decades, part 23 standards have become more complex as industry has generally shifted towards complex, high-performance aeroplanes. This transition has placed an increased burden on applicants seeking to certificate smaller, simpler aeroplanes. Public comments requested that the FAA focus on reducing the costs and time burden associated with certificating small aeroplanes by restructuring the requirements based on perceived risk.

The safety risk for most simple aeroplane designs is typically low.

On 15 August 2011, the Administrator chartered the Part 23 Reorganization Aviation Rulemaking Committee (ARC) to consider the following CPS recommendations:

'Recommendation 1.1.1 — Reorganize part 23 based on aeroplane performance and complexity, rather than the existing weight and propulsion divisions; and

Recommendation 1.1.2 — Certification requirements for part 23 aeroplanes should be written on a broad, general, and progressive level, segmented into tiers based on complexity and performance.'

ARC membership represented a broad range of stakeholder perspectives, including US and international manufacturers, trade associations, and foreign civil aviation authorities. The ARC was supported by FAA subject matter experts from all affected lines of business, from design and production certification to continued airworthiness and alterations. The NPRM includes a table of ARC participants.

In the ARC, EASA became involved in this initiative and could share their experience. Especially with respect to defining requirements for simple aeroplanes, the existing CS-VLA provided good reference material.

Each member or participant on the committee represented an identified segment of the aviation community, with the authority to speak on behalf of that segment. The ARC also invited subject matter experts to support specialised working groups and subgroups, as necessary. These working groups put forward recommendations and briefed the ARC as a whole. The ARC then collectively discussed and voted to accept or reject the recommendations. All of the recommendations included in the ARC's report had overwhelming majority agreement.

The ARC noted the prevailing view within industry was that the only way to reduce the programme risk, or business risk, associated with the certification of new aeroplane designs was to avoid novel design approaches and testing methodologies. The certification of new and innovative products today frequently requires the use of equivalent level of safety (ELOS) findings, special conditions, and exemptions. These take time, resulting in uncertainty and high project costs.

The ARC emphasised that although industry needs from the outset to develop new aeroplanes designed to use new technology, current certification costs inhibit the introduction of new technology. The ARC identified prescriptive certification requirements as a major barrier to installing safety-enhancing modifications in the existing fleet and to producing more up-to-date, safer aeroplanes.

The ARC also examined the harmonisation of certification requirements among the FAA and foreign civil aviation authorities (CAAs), and the potential for such harmonisation to improve safety while reducing costs. Adopting performance-based safety regulations that facilitate international harmonisation, coupled with internationally accepted means of compliance, could result in both significant cost savings and the enabling of safety-enhancing equipment installations. The ARC recommended that internationally accepted means of compliance should be reviewed and voluntarily accepted by the appropriate aviation authorities, in accordance with a process established by those authorities. Although each CAA would be capable of rejecting all or part of any particular means of compliance, the intent would be to have full civil authority participation in the creation of the means of compliance to ease acceptance of the means of compliance.

Having supported the conclusions from the ARC and based on them, EASA initiated the present rulemaking activity (RMT.0498) for the reorganisation of CS-23. With the new approach, it also was clear that the separate CS-VLA for the low-risk simple aeroplanes would not provide the same advantages for innovation as those that could be achieved in the new concept. Experience in EASA had already shown that the limitations of CS-VLA in scope and technology resulted in additional certification efforts for aeroplanes that are more modern and in a discontinuity at the border between CS-VLA and CS-23. Since aeroplanes certified against CS-VLA were already acceptable within the US certification system, the inclusion of the requirements from CS-VLA into the new concept was a logical step to take. Initial ideas to also include CS-LSA requirements (See A-NPA 2015-06) were abandoned for the time being because harmonisation of those requirements has not been achieved.

2.1.2. New safety requirements

The performance-based standards proposed in this NPA are designed to maintain the level of safety provided by the current CS-23 and CS-VLA requirements. The current CS-23 and CS-VLA weight and propulsion divisions were based on assumptions that do not reflect the diversity of performance capabilities, design complexity, technology, intended use, and seating capacity of today's new aeroplane designs, or the future aeroplane designs that will become possible as technology continues to evolve. EASA would therefore replace the current divisions with certification levels 1 through 4, low performance, and high performance.

Furthermore, this would replace the current divisions within the individual sections with technical and operational capabilities focused on the technical drivers (e.g. stall speed, visual flight rules (VFR) and instrument flight rules (IFR) operations, and pressurisation). These types of technical and operational criteria would apply a more appropriate set of standards to each aeroplane, and continue to accommodate the wide range of aeroplane designs within part 23.

The FAA-issued NPRM also proposes the introduction of a 'simple' category of aeroplanes that would coincide with the current scope of VLA. EASA however believes that the criteria that define the CS-VLA *scope today do not represent criteria (level 1, limited speed, low stall speed and only VFR operation) that should be combined into one definition at all times. These criteria should be identified as separate criteria when applicable at requirement and/or AMC level.*

To begin, EASA proposes to eliminate commuter, utility, and acrobatic aeroplane categories from CS-23, retaining only a normal category for all new CS-23 type certificated aeroplane design approvals. The differences between normal, utility, and acrobatic categories are currently very limited and primarily affect airframe structure requirements. The proposed CS-23 would continue to allow a normal category aeroplane to be approved for aerobatics, provided the aeroplane is certificated for the safety factors and defined limits of aerobatic operations.

In addition, EASA proposes that aeroplanes approved for spinning be certificated to aerobatic standards. Under the current CS 23.3(b), the utility category provides aeroplanes with additional margin for the more stringent inertial structural loads resulting from intended spinning and other manoeuvres. An aeroplane designed with traditional handling qualities and designed to allow spin training is more susceptible to inadvertent departure from controlled flight. EASA therefore believes that maintaining the current utility category for spin-and-limited-aerobatic-manoeuvres capable aeroplanes would negate the largest, single safety gain expected from this rulemaking action — the significant reduction in inadvertent stall-related departures from controlled flight.

Under this proposal, aeroplanes already certificated in the commuter, utility, and acrobatic categories would continue to fall within those categories. Each new aeroplane design, however, would be subject to varying levels of analysis, based on the potential risk and performance of the aeroplane's design. A more rigorous standard, such as that currently applied to commuter category aeroplanes, would apply to higher-risk and higher-performance aeroplanes.

The proposed requirements would also include new enhanced standards for resistance to departure from controlled flight. Recognising that the largest number of fatal accidents for General Aviation results from loss of control (LOC) in flight, EASA proposes to update certification standards to address these risks. LOC happens when an aeroplane enters a flight regime outside its normal flight envelope or performance capabilities and develops into a stall or spin: an event that can surprise the pilot. A pilot's lack of awareness of the state of the aeroplane in flight and the aeroplane's low-speed handling characteristics are the main causal factors of LOC accidents. Furthermore, stall and departure accidents are generally fatal because an aeroplane is often too low to the ground for the pilot to recover. Improving safety that reduces stall and LOC accidents would save lives. EASA is therefore proposing new rules for stall characteristics and stall warnings that would result in aeroplane designs more resistant to inadvertently departing controlled flight. Another type of low-speed LOC accident that occurs in significant numbers involves minimum control speed (V_{MC}) in light twin-engine aeroplanes. Virtually, all twin-engine aeroplanes have a V_{MC} that allows directional control to be maintained after one engine fails. This speed is usually above the stall speed of the aeroplane. However, light twin-engine aeroplanes typically have limited climb capability on one engine. In the accidents reviewed by the ARC and the FAA, often in these situations, pilots attempted to maintain a climb or maintain altitude, which slowed the aeroplane down, rather than looking for the best landing site immediately, maintaining control the whole way. If the aeroplane's speed drops below V_{MC}, the pilot may lose control.

The FAA NPRM is proposing to tie the minimum control speed to the stall speed of the aeroplane. Pilots, rather than attempting to maintain climb and lose directional control, would instead react appropriately with stall training techniques, resulting in a controlled descent rather than a loss of directional control.

The EASA NPA is in this respect slightly different because it is believed that not only handling characteristics will prevent these type of accidents, but also future technology could be effective means to mitigate this risk. EASA therefore proposes to accept envelope protection systems in the requirement for stall characteristics, stall warning, and spins.

EASA agrees to harmonise with the FAA NPRM on improved certification standards related to operations in severe icing conditions. In February 2012, the Part 23 Icing ARC formally identified a need to improve the part 23 regulations to ensure safe operation of aeroplanes and engines in supercooled large drop (SLD) and ice crystal conditions. In particular, the Part 23 Icing ARC recommended adopting most of the part 25 icing rules, including the requirement to show either that an aeroplane can safely fly in SLD conditions, or that it can detect and safely exit SLD. The proposals in this NPA, consistent with the NPRM, incorporate the recommendations of the Part 23 Icing ARC.

2.1.3. Consensus standards

EASA proposes to accept consensus standards as a means of compliance with the proposed CS-23 performance-based requirements. The use of consensus standards would be one means of compliance with the performance-based requirements of the proposed CS-23.

Although a consensus standard works in some cases, the Part 23 Reorganization ARC expressed concerns that a consensus standard could be biased in favour of a few large manufacturers and thereby create an unfair competitive advantage. In addition, comments received on A-NPA 2015-06 showed similar concerns. EASA notes that industry groups associated with the Part 23 Reorganization ARC identified ASTM International (ASTM) as an appropriate organisation to initiate the development of consensus standards, and that ASTM permits any interested party to participate in the committees developing consensus standards. EASA expects other consensus standards bodies to allow similar opportunities for interested parties to participate in their standards development work. In addition to consensus standards and the current prescriptive design standards in CS-23, any individual or organisation may develop their own proposed means of compliance that may be submitted to EASA for acceptance.

2.1.4. Harmonisation

EASA and the FAA have identified this rulemaking activity as a pilot project for the implementation of the Rulemaking Cooperation Guidelines for the Federal Aviation Administration and the European Aviation Safety Agency that were signed on 13 June 2013. The objective of this cooperation is to promote mutual rulemaking cooperation to maintain and further improve the harmonisation of the rules within the scope of Articles 2.B and 6 of the Agreement.

Consistent with this objective, the EASA proposal aims to address unnecessary differences in regulatory requirements between CS-23 and part 23. The General Aviation industry has repeatedly voiced the high costs to address differences between the airworthiness requirements of the different CAAs. EASA believes this proposal has the potential to achieve long-term harmonisation at an unprecedented level, and should result in significant savings for both European manufacturers exporting products to the US and US manufacturers exporting products to Europe. Even though there is a regulatory difference between the level of CS-23 (‘soft-law’ in Europe) and part 23 (implementing rule in the US), harmonisation on technical specification level is considered as an important prerequisite for further harmonisation and acceptance between EASA and the FAA. EASA requests comments regarding the potential cost savings. The work of the Part 23 Reorganization ARC forms the foundation of the proposed changes to CS-23 and part 23. From the onset, the ARC was a cooperative, international effort. Representatives from several CAAs and international members from almost every General Aviation manufacturer of aeroplanes and avionics participated in the Part 23 Reorganization ARC. Several international light-sport aircraft manufacturers, who were interested in certificating their products using part 23 airworthiness standards, also participated. In addition to recommending changes to part 23, the ARC developed proposals to help reduce certification costs through more international standardisation of certification processes and reducing or eliminating redundant certification activities associated with foreign certification.

After the ARC issued its report, EASA, the FAA, other foreign CAAs, and industry continued to work together to refine the ARC rule language until the FAA began drafting the NPRM in December 2014. This included formal meetings in July and November of 2014. EASA, Transport Canada Civil Aviation (TCCA), other foreign authorities, and industry offered significant contributions to these efforts.

In addition, EASA published A-NPA 2015-06 on 27 March 2015, which sets forth EASA's concept for its proposed reorganisation of CS-23, and provided an opportunity to provide comments.

2.1.5. Means of compliance

This proposal would allow type certificate applicants to use EASA AMC to streamline the certification process. This proposal, however, is shaped by two concerns raised in the Part 23 Reorganization ARC. First, the rule needs to clearly state that any applicant must use a means of compliance accepted by EASA when showing compliance with CS-23. EASA emphasises that any means of compliance would require EASA's review and acceptance. Second, although a means of compliance developed by a consensus standards body (i.e. ASTM, SAE, RTCA, etc.) may be available, any individual or organisation would also be able to submit their own means of compliance documentation to EASA for consideration and potential acceptance.

EASA anticipates that both individuals and organisations would develop acceptable means of complying with the proposed performance standards. A standards organisation, such as ASTM, could for example, generate a series of consensus-based standards for review and acceptance by EASA. When acceptable, EASA would include those as AMC to CS-23. The ASTM standards would be one, but not the only, way to demonstrate compliance with CS-23. Compliance with the current prescriptive requirements within current CS-23 would be yet another means of compliance available under this proposal. Similarly, within the scope of CS-VLA, the prescriptive requirements of the current CS-VLA would also remain another means of compliance to the performance-based requirements. Applicants would also still have the option to propose their own means of compliance as they do today. It is obvious that in the absence of appropriate AMC, an applicant may develop their own. The process for reviewing new means of compliance would not change substantially from the process in place today.

Using means of compliance documents to satisfy compliance with the proposed performance-based rules would diminish the need for special conditions, ELOS findings, and exemptions to address new technology advancements. Once EASA accepted a means of compliance, it could be used in future certification applications unless formally rescinded.

Incorporating the use of consensus standards as a means of compliance with performance-based regulations would provide EASA with the agility to more rapidly accept new technology as it develops, leverage industry experience and expectations to develop new means of compliance documents, and encourage the use of harmonised means of compliance among the industry and foreign CAAs. Although an applicant would not be required to use previously accepted means of compliance documents, doing so would streamline the certification process by eliminating the need for EASA to develop a certification review item (CRI) to address the certification of new technology. The Part 23 Reorganization ARC was also concerned that specialists in the industry could argue for complex means of compliance when the authority would accept a simpler or more cost effective approach. To address these concerns, EASA would continue to allow applicants to propose their own means of compliance when the larger industry standard may be the appropriate level of safety for one but not all certification levels. Additionally, 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).

2.2. Objectives

The overall objectives of the EASA system are defined in Article 2 of the Basic Regulation. This proposal will contribute to the achievement of the overall objectives by addressing the issues outlined in Section 2.1.

The overall objective of the proposal is to provide revitalisation impulse to General Aviation in Europe and to meet the European General Aviation Safety Strategy.

The specific objective of this proposal is to establish safe and cost-efficient rules for General Aviation by:

— decreasing the safety risks related to LOC in flight;

— developing cost-efficient rules in terms of certification process and harmonisation; and

— creating a rule structure which supports the development of technological innovations.

2.3. Impact analysis

A ‘light RIA’ has been developed for the related NPA under this rulemaking task. It is based on qualitative statements, which have been derived from the FAA NPRM 16-01 and adapted to the European context.

2.3.1. Safety impacts

Option 0 ‘No policy change’

The safety issues identified in Section 2.1.2 will remain unaddressed.

Option 1 ‘New concept for CS-23 and CS-VLA’

The number one accident cause in all areas of GA is LOC in flight. To address LOC accidents, EASA is focused on establishing safety objectives in the rules that will enable and support the development of consensus standards that can contribute to preventing these types of accidents. Although clear solutions are not yet all defined, the specific areas that require the flexibility to allow new developments are identified and, as such, reconfigured in the objective rules. The new rules for stall characteristics stall warning, and spins (see CS 23.215) aim for designs where the focus is on the aeroplanes' tendency to inadvertently depart controlled flight, instead of recovery requirements. This will allow for new consensus standards that detail how safer characteristics can be tested and demonstrated. Another element in LOC is the element of awareness. There are new or existing technologies that could assist in increasing the pilots' awareness. Today, the certification of these systems is burdensome. Therefore, the proportionality to the level of safety (captured by certification levels in the new rules, see CS 23.2005) is a change that would allow for a balance between the level of certitude, the appropriate level of safety, and the acceptable risk for each segment of General Aviation.

Question for stakeholders

The FAA has issued a NOTICE OF PROPOSED RULEMAKING REGULATORY EVALUATION "Revision of Airworthiness Standards for Normal, Utility, Acrobatic, and Commuter Category Aeroplanes 14 CFR Part 23" with an assessment of the safety benefits in section "VI.2.Safety Benefits" (See Docket FAA-2015-1621-0016)

Do you consider that a similar scale of safety benefits could be achieved in Europe?

Other safety-enhancing technologies (e.g. envelope protection/warning, moving map technology, etc.) can also benefit from the introduction of these proportionality drivers captured by these certification levels. They will provide the possibility to lower the threshold for certifying these types of systems when the overall safety level has been reached.

Moreover, occupant protection is seen as a further area for improvement. The current CS-23 is based on the seat and restraint technology as protection for the occupants. Looking at other industries and sports, improvements in occupant protection have been reached by introducing 'safe cell' concepts combined with energy absorption and crush zones. The objective rules are drafted at such a level so that they will not hamper developments in these directions.

2.3.2. Social impacts

Option 0 'No policy change'

The social impacts would be negative with a potential decline of General Aviation in Europe.

Option 1 'New concept for CS-23 and CS-VLA'

Option 1 will support a revitalisation of General Aviation in Europe. This may attract new persons flying or developing activities for General Aviation. There is a positive social impact.

2.3.3. Environmental impacts

Not relevant.

2.3.4. Economic impacts

Option 0 'No policy change'

The issues identified in Section 2.1.1 with the current certification process and the lack of support for innovation will remain unaddressed.

Option 1 'New concept for CS-23 and CS-VLA'

Based on Section 2.1.3 'Consensus standards', the following items have been assessed from an economic impact point of view.

Cost savings

Option 1 will expedite the certification process by avoiding the time-consuming development of special conditions, ELOS, and exemptions.

Question for stakeholders

The FAA has issued a NOTICE OF PROPOSED RULEMAKING REGULATORY EVALUATION "Revision of Airworthiness Standards for Normal, Utility, Acrobatic, and Commuter Category Aeroplanes 14 CFR Part 23" with an assessment of the cost savings in section "VI.3 Cost Savings"(See Docket FAA-2015-1621-0016)

Do you consider that a similar scale of cost savings could be achieved in Europe?

Higher development rate of new technologies

Technological developments in design and new methods of compliance demonstration will be embedded in consensus standards. The actual discussion and development will be taking place in the consensus process of these standards and not anymore in the context of rulemaking activities. Experience in the use of, and changes to, industry consensus standards in CS-LSA has shown that EASA can participate in said process and faster follow-up changes to referenced standards. It is expected that this will lead to more up-to-date AMC that better capture today's technology.

The facilitation of innovation introduction has a positive economic impact.

More efficient use of aviation authority resources

The shift from rulemaking to involvement and acceptance of consensus standards process will result in a change from considerable administrative activities (e.g. setting up rulemaking projects, drafting and review groups) to more technical involvement when appropriate. Experience in the acceptance of industry standards in CS-LSA has already shown that, when stakeholders are sufficiently involved in the development of these standards, the rulemaking and consultation process can be streamlined. This has already resulted in shortened lead times for such rulemaking tasks (10 months from the publication of Terms of Reference (ToR) to that of ED Decision 2013/015/R[5]).

The new concept for CS-23 and CS-VLA will have positive economic impacts for the aviation sector by requiring less administrative resources, and as a consequence a cheaper certification process.

2.3.5. GA and proportionality impacts

Option 0 'No policy change'

The too prescriptive requirements that are developed to cover complex CS-23 aeroplanes would remain applicable to most of the aeroplanes in CS-23. The European General Aviation Safety Strategy that acknowledges the different safety levels would not be embedded in the technical requirement.

[5] Decision 2013/015/R of the Executive Director of the Agency of 29 July 2013 adopting Amendment 1 of the Certification Specifications for Light Sport Aeroplanes (CS-LSA).

Option 1 'New concept for CS-23 and CS-VLA'

The flexibility of the requirements with Option 1 will support the European General Aviation Safety Strategy.

2.3.6. Harmonisation and global picture

Option 0 'No policy change'

Option 1 'New concept for CS-23 and CS-VLA'

The current situation where there is a level of harmonisation would become worse when the FAA NPRM would introduce performance-based rules in the US while EASA would need to use the prescriptive CS-23 and CS-VLA. This would increase the need for special conditions.

2.4. Conclusion and preferred option

Option 1, 'New concept for CS-23 and CS-VLA', is the preferred option. It will support the achievement of the objectives by improving aviation safety and lowering the certification costs through a more flexible process where innovation can be easily taken into account when relevant.

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

As expressed by many commentators in response to A-NPA 2015-06, harmonisation is considered vital for the success of this reorganisation and use of consensus standards. It is also believed that this is the opportunity to make the change to objective rules where there should be hardly any need to amend these rules in the near future. Rulemaking due to technological developments should become an exception and any foreseeable developments that would require amendment of the proposed rule should be an indication that the current proposal does not reach the target of stable rules yet. For the readers' convenience, *the proposed requirements in Chapter 5 of this NPA contain, in blue italic print, statements that explain if and how differences with the text in NPRM 16-01 are proposed.*

3.1. General harmonisation issues

3.1.1. Numbering

Both A-NPA 2015-06 and the FAA NPRM have proposed a new numbering system for the reorganised CS-23/Part 23. In order to assure that there will be no confusion between the current rules and the reorganised rules, it is believed that a new numbering should be introduced where there are no numbers equal to the present rule when their content is not the same.

A proposal would be to restart numbering and use incremental steps as follows:

SUBPART A — GENERAL

23.2000

23.2005, etc.

SUBPART B — FLIGHT

23.2100

23.2105, etc.

SUBPART C— STRUCTURE

23.2200

23.2205, etc.

SUBPART D — DESIGN AND CONSTRUCTION

23.2300

23.2305, etc.

SUBPART E – POWERPLANT

23.2400

23.2405, etc.

SUBPART F — SYSTEMS AND EQUIPMENT

23.2500

23.2505, etc.

SUBPART G — FLIGHT CREW INTERFACE AND OTHER INFORMATION

23.2600

23.2605, etc.

3.1.2. Language

EASA believes that it is important to use (as far as possible) the same text in CS-23/Part 23. The EASA CS-23 is however more a technical standard, while Part 23 is addressing the applicant's responsibility. Therefore the NPRM often uses the phrase 'the applicant must demonstrate'.

A common wording is proposed that mixes both into the following: 'The applicant's design must comply with (…)'.

4. References

4.1. Affected Decisions

Decision 2003/014/RM of the Executive Director of the Agency of 14 November 2003 on certification specifications, including airworthiness codes and acceptable means of compliance for normal, utility, aerobatic and commuter category aeroplanes ('CS-23'), as last amended by Decision 2015/018/R of 15 July 2015.

Decision 2003/018/RM of the Executive Director of the Agency of 14 November 2003 on certification specifications, including airworthiness codes and acceptable means of compliance for very light aeroplanes ('CS-VLA'), as last amended by Decision 2009/003/R of 26 February 2009.

4.2. Reference documents

Report from the 14 CFR Part 23 Reorganization Aviation Rulemaking Committee (ARC) to the Federal Aviation Administration (FAA) — Recommendations for increasing the safety of small general aviation aeroplanes certificated to 14 CFR Part 23, 5 June 2013.

A-NPA 2015-06 Reorganisation of Part 23 and CS-23

FAA Proposed Rule "Airworthiness Standards for Normal, Utility, Acrobatic, and Commuter Category Aeroplanes.(See Docket FAA-2015-1621-0016)

5. Proposed CS-23 performance-based requirements

CS-23

SUBPART A — GENERAL

CS-23.2000 Definitions

Rationale for changes considering the A-NPA and the NPRM

In comparison with the FAA NPRM, EASA proposes not to include the 'empty weight' definition because that definition is considered too design-specific. Future technological developments (e.g. electric propulsion with batteries) would necessitate changes and therefore future rulemaking. This is not meeting the original objective to make the objective rules 'change resistant' for the next 20 years. An amended definition of the 'designated fire zone' is similar to that in 23.450(a) as proposed in the A-NPA.

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

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

(b) 'Designated fire zone' means a zone where catastrophic consequences from fire in that zone must be mitigated by preventing the spread of the fire to other parts of the aeroplane.

CS-23.2005 Certification of normal category aeroplanes

Rationale for changes considering the A-NPA and the NPRM

EASA proposes to follow the NPRM proposed levels that consistently use the number of passengers. The definition of manoeuvres for normal and aerobatic is also taken from the NPRM. The NPRM proposed definition of 'simple' is not supported by EASA since the criteria that define 'simple' are design-related and expected to change over time. Details showing how the use of the definition 'simple' is replaced, can be found in the rationale for changes considering the A-NPA and the NPRM for 23.2320 and 23.2400.

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

(b) Aeroplane certification levels are:

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

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

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

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

(c) Aeroplane performance levels are:

(1) Low speed — for aeroplanes with a V_C or $V_{MO} \leq 250$ Knots Calibrated Airspeed (KCAS) (and $M_{MO} \leq 0.6$).

(2) High speed — for aeroplanes with a V_C or $V_{MO} > 250$ KCAS (or $M_{MO} > 0.6$).

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

(1) Stalls (except whip stalls); and

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

(e) Aeroplanes certified for aerobatics may be used to perform manoeuvres without limitations, other than those limitations necessary to avoid damage or injury.

SUBPART B — FLIGHT

CS-23.2100 Mass and centre of gravity

Rationale for changes considering the A-NPA and the NPRM

This EASA proposal is consistent with the NPRM.

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

(b) The applicant design must comply with each requirement of this subpart at each combination of mass and centre of gravity within the aeroplane's range of loading conditions using tolerances appropriate for the certification level and performance level of the aeroplane.

(c) The condition of the aeroplane at the time of determining mass and centre of gravity must be defined.

CS-23.2105 Performance data

Rationale for changes considering the A-NPA and the NPRM

The EASA proposal is consistent with the NPRM except that (b)(3) is introduced because also performance impacts at lower temperatures are expected (e.g. in the case of propulsion batteries). In order to avoid demonstration of compliance under extreme low temperatures, the wording 'within expected operation' is used.

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

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

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

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

(ii) Levels 3 and 4 aeroplanes.

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

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

(2) Temperatures from standard to 30°Celsius above standard or the maximum ambient atmospheric temperature at which compliance with cooling requirements is shown, if lower; and

(3) The minimum ambient atmospheric temperature within expected operation, when low temperature has detrimental effects on performance.

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

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

CS-23.2110 Stall speed

Rationale for changes considering the A-NPA and the NPRM

The EASA proposal is consistent with the NPRM, except that 'normal' is added to avoid compliance showing outside expected conditions.

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

CS-23.2115 Take-off performance

Rationale for changes considering the A-NPA and the NPRM

The EASA proposal is aiming for consistency with the NPRM and therefore now defines the 15 m (50 ft) threshold. However, in (c) the weight limit of multi-engine aeroplanes has been deleted since weight is not considered to provide the right discriminator for risk levels. If a higher than anticipated risk would exist for a multi-engine low speed 'cargo' design, a special condition will be defined to mitigate the risk.

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

(1) Stall speed safety margins;

(2) Minimum control speeds; and

(3) Climb gradients.

(b) For all aeroplanes, take-off performance includes:

(1) the ground roll distance required to take off; and

(2) the initial climb distance to 15 m (50 ft) above the take-off surface.

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

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

(2) Ground roll and initial climb to 15 m (50 ft) above the take-off surface; and

(3) Net take-off flight path.

CS-23.2120 Climb performance

Rationale for changes considering the A-NPA and the NPRM

The EASA proposal is aiming for consistency with the NPRM although all the different performance numbers seem overcomplicated. In order, however, not to change the current safety level, these existing numbers are kept.

The NPRM proposed paragraphs 23.120(b)(4) and (5) are already covered by 23.2015(a) and therefore removed.

(a) The applicant's design must comply with the following minimum climb performance out of ground effect:

(1) With all engines operating and in the initial climb configuration:

(i) For levels 1 and 2 low speed aeroplanes, a climb gradient at sea level of 8.3 percent for landplanes and 6.7 percent for seaplanes and amphibians; and

(ii) For levels 1 and 2 high-speed aeroplanes and all level 3 and 4 aeroplanes, a climb gradient at take-off of 4 percent.

(2) After a critical loss of thrust on multi-engine aeroplanes:

(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) in the cruise configuration;

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

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

(3) A climb gradient of 3 percent during balked landing, without creating undue pilot workload.

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

(1) For all engines operating;

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

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

CS-23.2125 Landing performance

Rationale for changes considering the A-NPA and the NPRM

The EASA proposal is aiming for consistency with the NPRM. Details for water operation in (a) are removed since those can be covered in the standards.

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.

(b) The approach and landing speeds, configurations, and procedures, which allow a pilot of average skill to meet the landing distance consistently and without causing damage or injury.

CS-23.2130 Controllability

Rationale for changes considering the A-NPA and the NPRM

The EASA proposal is aiming for consistency with the NPRM. The configuration details and specific margin in (b) are not kept because a future design (e.g. VTOL) would not be able to comply with them. These design-specific details shall be covered in the standards. The objective of the NPRM proposed 23.200(c) is covered by (a)(3) and needs to be supported by details in the AMC.

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

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

(2) During low-speed operations, including stalls;

(3) With any likely flight control or propulsion system failure; and

(4) During configuration changes.

(b) The aeroplane must be able to make a safe landing when following the landing procedures, providing a safe margin below V_{REF} or above approach angle of attack.

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

CS-23.2135 Trim

Rationale for changes considering the A-NPA and the NPRM

EASA proposes to separate and elaborate on the trim conditions in (a), while the requirements for the different levels are captured in (b). The NPRM did not take into account that residual forces in lateral and directional direction are acceptable for level-1, level-2, and level-3 aeroplanes (for example, as a result of having no trim in this direction, or only ground-adjustable trim tabs, which is not causing any safety issues).

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

(1) Climb;

(2) Level flight;

(3) Descent; and

(4) Approach.

(b) The aeroplane must maintain lateral and directional trim under the following conditions:

(1) For levels 1, 2, and 3 aeroplanes, in cruise, without fatiguing residual force upon the primary flight controls by the pilot, or the flight control system; and

(2) For level 4 aeroplanes in normal operations, without further force upon, or movement of, the primary flight controls or corresponding trim controls by the pilot, or the flight control system.

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

CS-23.2140 Stability

Rationale for changes considering the A-NPA and the NPRM

This EASA proposal is consistent with the NPRM.

(a) Aeroplanes not certified for aerobatics must:

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

(2) Have dynamic short period and combined lateral-directional stability in normal operations; and

(3) Provide stable control force feedback throughout the operating envelope.

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

CS-23.2145 Stall characteristics, stall warning, and spins

Rationale for changes considering the A-NPA and the NPRM

The NPRM does not provide the flexibility that is needed for future designs. EASA proposes to allow three options for level-1 and level-2 aeroplanes and level-3 single-engine aeroplanes, not certified for aerobatics:

This would provide access for future envelope protection systems as well as cater for existing safe aeroplanes that can depart controlled flight but do so in a benign way.

Both the A-NPA and NPRM seem to have missed the requirement for level-3 multi-engine and all level-4 aeroplanes, not certified for aerobatics, that must not have a tendency to suffer a loss of control after a likely critical loss of thrust.

The requirement (d)(2) in the NPRM is considered as a crew interface requirement that should not be in the airworthiness (design) requirements and is removed.

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

(b) Levels 1 and 2 aeroplanes and level 3 single-engine aeroplanes, not certified for aerobatics, must

(1) Not have a tendency to inadvertently depart controlled flight; or

(2) Have a benign behaviour when departing controlled flight; or

(3) Have a system preventing departure from controlled flight.

(c) Level-3 multi-engine and all level-4 aeroplanes, not certified for aerobatics, must not have a tendency to suffer a loss of control after a likely critical loss of thrust.

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

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

CS-23.2150 Ground- and water-handling characteristics

Rationale for changes considering the A-NPA and the NPRM

This EASA proposal is technically consistent with the NPRM except for editorial changes. Reflection of information in the AFM is moved to pilot interface requirements in Subpart G.

(a) The aeroplane has satisfactory longitudinal and directional ground-handling characteristics during taxi, take-off, and landing operations within the established wind conditions.

(b) In addition, for a seaplane or amphibian:

(1) Water spray is not dangerously interfering with the operations or damaging the aeroplane at any time; and

(2) Wave heights and necessary water-handling procedures for safe operation are established.

CS-23.2155 Vibration, buffeting, and high-speed characteristics

Rationale for changes considering the A-NPA and the NPRM

This EASA proposal keeps the (a) and (d) from the NPRM, but removes in (b) and (c) the compliance details. Those compliance details will be dealt with by the AMC. The speed terms used are defined through CS-Definitions.

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

(b) If a maximum operating speed V_{MO}/M_{MO} is established, there is no perceptible buffeting in cruise configuration in straight flight at any speed up to V_{MO}/M_{MO}, except stall buffeting.

(c) For high-speed aeroplanes or aeroplanes with a maximum operating altitude greater than 7 625 m (25 000 ft) pressure altitude, the boundary of perceptible buffet is determined in the cruise configuration within the operational envelope. A likely inadvertent excursion beyond this boundary does not result in unsafe conditions.

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

(1) An inadvertent speed increase; and

(2) A high-speed trim upset.

CS-23.2160 Performance and flight characteristics requirements for flight in icing conditions

Rationale for changes considering the A-NPA and the NPRM

This EASA proposal is technically consistent with the NPRM; however, (a) and (a)(2) are revised to promote clarity.

(a) If an applicant requests certification for flight in icing conditions as specified in Part 1 of Appendix C to CS-25 and any additional atmospheric icing conditions for which an applicant requests certification, with the ice protection system in normal operation, the applicant's design must:

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

(i) 250 knots CAS;

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

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

(2) Provide the same and consistent means to alert the pilot on stall for flight in icing conditions and non-icing conditions.

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

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

CS-23.2165 Flight in icing conditions

Rationale for changes considering the A-NPA and the NPRM

This EASA proposal is technically consistent with the NPRM.

(a) If an applicant requests certification for flight in icing conditions, the applicants' design must be so that:

(1) The ice protection system provides for safe operation; and

(2) The aeroplane is protected from stalling when the autopilot is operating in a vertical mode.

(b) The demonstration specified in paragraph (a), must be conducted in atmospheric icing conditions specified in Part 1 of Appendix C to CS-25, and any additional icing conditions for which certification is requested.

FLIGHT — INFORMATION

CS-23.2170 Operating limitations

Rationale for changes considering the A-NPA and the NPRM

Consistently throughout the NPA, each subpart has a requirement specifying WHAT information should be established, while the presentation to the pilot or end-user is captured in Subpart G — FLIGHT CREW INTERFACE AND OTHER INFORMATION.

The following flight information is established:

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

(b) Essential speed and performance information.

SUBPART C — STRUCTURES

Rationale for changes considering the A-NPA and the NPRM

The EASA proposal is following the organisational structure of Subpart C in the NPRM. This provides a logical sequence starting with 'Design Envelope', and detailing step-by-step through design loads in general, to flight, ground and component loads.

The design requirements proposed in the NPRM 23.500 Structural design, 23.505 Protection of structure, 23.510 Materials and processes and 23.515 Special factors of safety are, however, not proposed to be covered in Subpart C, but should stay in Subpart D, as they also affect other components and not only the airframe structure. By re-sorting this way, Subpart C really and only addresses the airframe structure.

CS-23.2200 Structural design envelope

Rationale for changes considering the A-NPA and the NPRM

EASA proposes to remove the definitions of speeds from the NPRM 23.300 because they are typical design configuration-related. Instead, the more generic proposal from the A-NPA 23.320 is suggested for (a)(1) and (2).

The proposed (c) and (d) in the NPRM are too design-specific and are replaced by the A-NPA 23.305 text.

The NPRM proposed (e) would create a requirement that is not applicable to VLA today. The intent is covered by the new proposal for Flight Loads in CS-23.2225.

EASA proposes that the current requirement for addition redistribution of loads due to deflections under loads should be covered here. This is currently missing in the NPRM.

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

(a) Structural design airspeeds to be considered when determining the corresponding manoeuvring and gust loads.

(1) The design speeds are sufficiently greater than the stalling speed of the aeroplane to safeguard against loss of control in turbulent air.

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

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

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

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

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

CS-23.2205 Interaction of systems and structures

Rationale for changes considering the A-NPA and the NPRM

The NPA proposal is harmonised with the NPRM.

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.

STRUCTURAL LOADS

CS-23.2220 Structural design loads

Rationale for changes considering the A-NPA and the NPRM

The NPA proposal is harmonised with the NPRM, except that in (3) the reference to service history is removed because that will not always be available for innovative design.

(a) The applicant must:

(1) 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;

(2) 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.

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

CS-23.2225 Flight load conditions

Rationale for changes considering the A-NPA and the NPRM

The NPRM proposal does not cover the objective that loads should be considered for the operational envelope, but instead are based on measured gust statistics. EASA does not support this and therefore proposes to use the A-NPA text that is more objective and does not include design details (e.g. the NPRM (c) is design-specific).

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

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

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

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

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

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

CS-23.2230 Ground and water load conditions

Rationale for changes considering the A-NPA and the NPRM

EASA proposes to use the A-NPA 23.325 text that is more objective and does, for instance, cover landing on snow or other surfaces by using the term 'applicable landing surface'. These surface conditions are missing in the NPRM proposal, and should be covered by AMC.

Loads, including taxi, take-off, landing, and handling loads, expected in service under the anticipated operating conditions are determined for:

(a) The applicable critical mass(es);

(b) The acceptable descent velocity (V);

(c) The applicable landing surface; and

(d) Normal and adverse landing attitudes and configurations.

CS-23.2235 Component loading conditions

Rationale for changes considering the A-NPA and the NPRM

The proposed requirement is covering the loads on components subject to the earlier defined loads (23.2205 – 23.2220). It is proposed to simplify the requirement and reflect the relation to the previous requirements.

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

(1) Interaction of systems and structures;

(2) Structural design loads;

(3) Flight load conditions; and

(4) Ground and water load conditions.

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

CS-23.2240 Limit and ultimate loads

Rationale for changes considering the A-NPA and the NPRM

The specific case where strength specifications are only expressed in ultimate loads and permanent deformation is accepted also needs to be covered in this requirement.

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

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

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

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

STRUCTURAL PERFORMANCE

CS-23.2250 Structural strength

Rationale for changes considering the A-NPA and the NPRM

The NPA proposal is harmonised with the NPRM.

The applicant must demonstrate that the structure will support:

(a) Limit loads without:

(1) Interference with the operation of the aeroplane; and

(2) Detrimental permanent deformation.

(b) Ultimate loads.

CS-23.2255 Structural durability

Rationale for changes considering the A-NPA and the NPRM

EASA proposes to replace the design-specific requirement in the NPRM 23.405(b) by objectives as those proposed in the A-NPA 23.340(b). This also allows proportionality to different certification levels.

New, more objective requirements should replace the proposed requirements related to pressurised aeroplanes and uncontained engine failure.

In that respect, the NPRM 23.405(d) is too specific to engine rotor burst: other risks could be expected from new technologies that should also be considered.

(a) The applicant must develop and implement procedures to prevent structural failures due to foreseeable causes of strength degradation, which could result in serious or fatal injuries, loss of the aeroplane, or extended periods of operation with reduced safety margins.

(b) Appropriate to the certification level, the aeroplane is designed to enable continued safe flight and landing subsequent to a likely structural damage.

(c) The aeroplane must be capable of continued safe flight and landing with likely structural damage due to hazards originating from high energy, associated with systems and equipment.

CS- 23.2260 Aeroelasticity

Rationale for changes considering the A-NPA and the NPRM

The NPA proposal is harmonised with the NPRM.

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

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

(2) For any configuration and condition of operation;

(3) Accounting for critical degrees of freedom; and

(4) Accounting for any critical failures or malfunctions.

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

STRUCTURAL OCCUPANT PROTECTION

CS-23.2270 Emergency conditions

Rationale for changes considering the A-NPA and the NPRM

This requirement is consistent with the NPRM proposal for 23.600 except for:

— *The specific condition in the NPRM in (b) 'dynamic' should be covered by AMC when appropriate for that type of aeroplane and operation; and*

— *Design solution, like seats and restraints (proposed in 23.600(c) and (d)), are not an objective and should be covered by AMC.*

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

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

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

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

(b) The emergency landing conditions specified in paragraph (a) 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 aeroplane configuration, including likely failure conditions at impact; and

(2) Not exceed established human injury criteria for human tolerance due to restraint or contact with objects in the aeroplane.

(c) Each baggage and cargo compartment must:

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

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

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

SUBPART D — DESIGN AND CONSTRUCTION

Rationale for changes considering the A-NPA and the NPRM

The design requirements proposed in the NPRM 23.500 Structural design, 23.505 Protection of structure, 23.510 Materials and processes and 23.515 Special factors of safety are moved back into Subpart D under 23.2200–23.2215, as they also affect other components not just the airframe structure. By re-sorting this way, Subpart C only addresses the airframe structure.

CS-23.2300 Design and construction principles

Rationale for changes considering the A-NPA and the NPRM

The details in (d) that were proposed in the A-NPA 23.400 and NPRM 23.500, that describe what parts of the system should be subject to which loads, is removed because this is design-specific. Special cases like flying ailerons and vectored thrust systems will require specific criteria. Therefore, this should be covered in the AMC.

The general principle for doors, canopies, hatches and access panels proposed in the NPRM in 23.750(f) is new and is now captured here in (e).

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

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

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

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

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

CS-23.2305 Protection of structure

Rationale for changes considering the A-NPA and the NPRM

No technical changes compared to the A-NPA and the NPRM, only editorial as it is not physically possible for the applicant to personally protect each part.

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

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

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

CS-23.2310 Materials and processes

Rationale for changes considering the A-NPA and the NPRM

Paragraph (e) from the NPRM has been introduced and made applicable not just to structure but also to essential components when effects are expected to be significant. This requirement does not aim at each component and at the whole structure. AMC needs to define what is to be considered and when this is 'significant'.

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

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

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

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

(e) If thermal effects are significant on structure or essential components under normal operating conditions, the applicant must account for those effects.

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

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

CS-23.2315 Special factors of safety

Rationale for changes considering the A-NPA and the NPRM

Compared to the A-NPA proposal, the requirement (a) defines the scope that is not restricted to structure because already today parts like bellcranks and castings can require the use of special factors.

The NPRM proposed 23.515(b)(1) is amended to consider the criticality with respect to strength within the scope established by (a).

(c) The existing wording in CS-23 and part 23 today does not require special factors to be applied to ultimate loads that do not have corresponding limit loads; for example, emergency landing conditions. The proposed NPRM wording would raise this requirement above today's CS-23. There is no safety concern that would justify this, therefore this is changed back to what it is today, compared with the NPRM.

(c) The proposed NPRM wording would be required to apply to any special factor of safety. Both, CS-23 and part 23 as of today, only require to apply the 'highest pertinent' factor of safety. As there may be more than one special factor of safety applicable to one design detail, this would raise this requirement above today's CS-23. There is no safety concern that would justify this, therefore this is changed back to what it is today, compared with the NPRM.

(a) Special factors of safety are established and applied in the design for each part, article or assembly whose critical design value affecting strength is:

(1) Uncertain;

(2) Likely to deteriorate in service before normal replacement; or

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

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

(1) Kind of application;

(2) Inspection method;

(3) Structural test requirement;

(4) Sampling percentage; and

(5) Process and material control.

(c) The factor of safety in CS 23.2240(a)(2) is multiplied by the highest pertinent special factor of safety.

CS-23.2320 Flight control systems

Rationale for changes considering the A-NPA and the NPRM

In general, the NPRM is followed with the following changes:

(a)(1)(i) Is stating 'likely' in order to avoid compliance-showing efforts in e.g. conventional cable systems where experience shows their reliability. AMC will set acceptable design standards. The likely failure conditions also include the latent failures, as were discussed with respect to stall barrier systems. The NPRM was explicitly asking for all except 'simple aeroplanes' to have a trim system as alternative means to control the aeroplane, in case of failure of a connecting or transmitting element. This NPA proposed language asks to 'prevent major, hazardous and catastrophic hazards, including -- (i) likely failure conditions'. It is understood that this requirement allows for the exemption for 'simple aeroplanes', that is, VLA. In the same step, it allows for alternatives than only trim control. The definition how this shall be complied with for each level of aeroplane will be provided in the design-specific AMC.

(b)(2) Trim systems, when installed, shall meet these requirements. The need to include a trim system (e.g. today not required for longitudinal direction in CS-VLA) is specified in AMC and, as mentioned above, linked to

the likely failure conditions in (a)(1)(i). 'Trim system indication' (b)(2)(iv) similarly has been changed and eliminates the use of the definition of a 'simple aeroplane'. As a consequence, indication of the range for take-off will now also apply to VLA aircraft. Discussions have concluded that this is not adding any significant burden to the applicant, and therefore can be tolerated.

(a) The flight control systems must:

(1) Prevent major, hazardous, and catastrophic hazards, 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;

(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.

(c) For level3 high-speed and all level-4 aeroplanes, an applicant must install a take-off warning system on the aeroplane unless the applicant demonstrates that the aeroplane, for each configuration, can take off at the limits of the trim and flap ranges.

CS-23.2325 Landing gear systems

Rationale for changes considering the A-NPA and the NPRM

The order of the requirements in the NPRM is changed and first identifies general requirements before specific requirements for 'retractable' (here called 'a system that actuates the landing gear') are provided.

The NPRM requirements for the landing gear are too design-specific and include things like brakes, wheels, tyres, skis, etc. This proposal removes those design details and replaces them with objectives that, for instance, would also work for air cushions. An example is the landing gear bay that is too design-specific. The intent is covered by the objective in (b)(4): the 'likely system failures and likely operation environment' cover tyre failures, debris on systems in the gear bay, slush, stones, etc.

Requirement 23.705(d) in the NPRM related to the rejected take-off for level-3 and level-4 aeroplanes is removed and the intent covered by the statement 'required to demonstrate aborted take-off capability'. This links it to the take-off performance requirement.

The new (d)(4) is a prescriptive requirement that is included in order to prevent the use of a safety analysis ('1309').

(a) The landing gear includes the parts and systems necessary to support and control the aeroplane during surface operation and to make a safe transition from surface to flight operation, and flight to surface operation.

(b) The landing gear is designed to:

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

(2) absorb energy and support loads from take-off, landing and surface operation;

(3) Support the expected loads with sufficient margin; and

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

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

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

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

(2) information provided when the landing gear is not in the intended position;

(3) Landing gear position information provided; and

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

CS-23.2330 Buoyancy for seaplanes and amphibians

Rationale for changes considering the A-NPA and the NPRM

These requirements are adopted from the NPRM; however, (b) is changed because it assumes different compartments, which is design-specific. For example, foam filled floats do not have the compartments, but meet the intent.

Aeroplanes intended for operations on water must:

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

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

OCCUPANT SYSTEM DESIGN PROTECTION

CS-23.2335 Means of egress and emergency exits

Rationale for changes considering the A-NPA and the NPRM

The NPRM proposes a 90-second evacuation time that is not in the current Part 23 and not considered reasonable for all aeroplanes within the range. It is better to leave the acceptable design solutions up to AMC.

Details in the NPRM proposal (b), (c) and (d) must be covered by the AMC. Their intent is covered by the proposed (a).

The requirement in the NPRM (f) for doors, etc. is moved to 23.2300 Design and construction principles.

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

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

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

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

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

CS-23.2340 Occupant physical environment

Rationale for changes considering the A-NPA and the NPRM

The requirement for the external view as proposed in the NPRM (a)(2) is covered in this NPA in the crew interface paragraph CS-23.2600 in Subpart G.

Protection of the pilot against serious injury due to hazards originating from high-energy rotating failures is amended in order to include any high-energy risks, likely to be related to innovative propulsion systems, for example.

(a) The applicant must design the aeroplane to:

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

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

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

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

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

(d) If an oxygen system is installed in the aeroplane, it must include a reliable means to:

(1) Determine the quantity of oxygen available in each source of supply on the ground and in flight;

(2) Determine whether oxygen is being delivered; and

(3) Isolate the oxygen supply in flight to mitigate hazards.

(e) If a pressurisation system is installed in the aeroplane, it must include:

(1) A warning if an unsafe condition exists; and

(2) A pressurisation system test.

FIRE AND HIGH ENERGY PROTECTION

CS-23.2345 Fire protection outside designated fire zones

Rationale for changes considering the A-NPA and the NPRM

EASA is of the opinion that the proposed requirement is describing design solutions instead of objectives. Future designs that are different but acceptable are hampered by this level of detail. It is proposed to follow the A-NPA text from CS 23.445.

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

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

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

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

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

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

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

(3) Specifying designated fire zones that meet the specifications of CS 23.2350.

CS-23.2350 Fire protection in designated fire zones

Rationale for changes considering the A-NPA and the NPRM

The requirement 23.805(b) in the NPRM is reflecting current design-specific requirements that should be amended to cover other ‘new’ designated fire zones, for instance, batteries.

In addition to CS-23.2345:

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

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

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

CS-23.2355 Lightning protection of structure

Rationale for changes considering the A-NPA and the NPRM

It is proposed to relate this requirement to the type of environment that causes the risk instead of only to the type of operation as proposed in the NPRM. The reference to IFR is replaced by the risk of exposure to lightning.

(a) For aeroplanes where the exposure to lightning is likely, no structural failure preventing continued safe flight and landing may occur from exposure to the direct effects of lightning.

(b) All other aeroplanes must achieve lightning protection by following design practices accepted by the authority.

CS-23.2360 Design and construction information

Rationale for changes considering the A-NPA and the NPRM

Consistently throughout the NPA, each subpart has a requirement specifying WHAT information should be established, while the presentation to the pilot or end-user is captured in Subpart G — FLIGHT CREW INTERFACE AND OTHER INFORMATION.

(a) The following design and construction information is established:

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

(2) The need for instrument markings or placards;

(3) Any additional information necessary for the safe operation of the aeroplane; and

(4) Inspections or maintenance to assure continued safe operation.

SUBPART E — POWERPLANT

CS-23.2400 Powerplant installation

Rationale for changes considering the A-NPA and the NPRM

The likely operating conditions in (b)(1) are intended to also cover negative accelerations. Therefore the NPRM proposed 23.925(a) is removed.

The different risk levels of 'foreign object threats' (in practice, for small aeroplanes a likely event with limited safety effect) are included but require proportionate AMC.

In the NPRM (c), it is proposed that except for simple aeroplanes, each power unit must be type certified. EASA is of the opinion that the need to type certify an engine should be covered by Part-21. Therefore the powerplant can have a type certificate, but could also be certified as part of the aircraft (e.g. with integrated multiple electric motors). In that case, the powerplant would need to meet the technical requirements. Certification process requirements are also expected to become applicable to other components, like batteries. This is not related to the size or speed of the aeroplane. Therefore the use of the definition 'simple' aeroplane is not supported.

A definition of 'energy' for the purposes of this Subpart is included.

A new (g) is covering the powerplant installation requirement, which should not to be confused with a very similar requirement included at the energy storage and distribution system hazard mitigation (23.2430).

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

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

(1) All likely operating and environmental conditions, including foreign object threats;

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

(3) Likely hazards in operation, including hazards to ground personnel.

(c) Each engine, propeller and APU must be type certificated, or meet accepted specifications.

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

(e) As applicable, the powerplant installation must account for vibration and fatigue.

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

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

CS-23.2405 Propulsion augmentation systems

Rationale for changes considering the A-NPA and the NPRM

This includes auto power control systems and reversers, but opens up also to other implementations, like asymmetric thrust to act as flight controls. New standards need to define how to translate this for specific system concepts.

The title is changed in order to cover also propulsion augmentation systems in any direction (drag, thrust, direction, lift). This therefore includes the NPRM proposed requirements for reversing systems.

(a) Propulsion augmentation systems are systems that intervene — manually or automatically — with the power selection commanded by the direct power settings.

(b) System intended for in-flight use must be designed so that no unsafe condition will result during normal operation of the system.

(c) Any single failure or likely combination of failures of a system intended to augment the propulsion has no catastrophic effect.

(d) Inadvertent operation of the system by flight crew is prevented or does not result in an unsafe condition.

(e) Unless failure of a propulsion augmentation system is '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.

CS-23.2410 Powerplant installation hazard assessment

Rationale for changes considering the A-NPA and the NPRM

The EASA proposal is consistent with the NPRM.

(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) Prevent continued safe flight and landing;

(2) Cause serious injury that may be avoided; and

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

CS-23.2415 Powerplant ice protection

Rationale for changes considering the A-NPA and the NPRM

The EASA proposal is consistent with the NPRM.

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

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

CS-23.2420 Powerplant fire protection

Rationale for changes considering the A-NPA and the NPRM

The NPRM contains too many design details that need to be covered by the AMC, and if included will require frequent changes due to technological developments. Only the objective is proposed.

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

CS-23.2425 Powerplant operational characteristics

Rationale for changes considering the A-NPA and the NPRM

The NPA 23.2400(b)(1) covers the proposed 23.950(a) in the NPRM. The text from the A-NPA is proposed instead of the NPRM 23.925(b) & (c) because that better covers the objective, while design details are left out.

(a) 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.

CS-23.2430 Energy storage and distribution system hazard mitigation

Rationale for changes considering the A-NPA and the NPRM

The NPRM contains specific fuel system requirements that have been replaced by less design-specific requirements for propulsion systems that can run on any type of energy.

(a) The energy system, containing high amount of energy, is designed to minimise hazards to the occupants in case of survivable emergency landings. For certification level-4 aircraft, failure due to overload of the landing system is taken into account.

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

(c) Powerplant energy system hazards in maintenance activities and during ground handling or operation are mitigated by design or procedures.

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

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

CS-23.2435 Powerplant support systems

Rationale for changes considering the A-NPA and the NPRM

The NPRM did not contain specific requirements for powerplant supporting systems, e.g. converters or battery cooling systems. Requirements for induction and exhaust are included here.

(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 considered in the engine reliability.

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

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

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

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

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

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

CS-23.2440 Energy system — General

Rationale for changes considering the A-NPA and the NPRM

The NPRM contained specific requirements for fuel systems. These have been merged into more generic (design independent) energy systems.

(a) Each energy storage and supply system is able to appropriately retain the energy under all permitted and likely environmental and operating conditions.

(b) Each energy storage and supply system provides energy to the powerplant with adequate reserves to ensure safe functioning under all permitted and likely operating conditions, considering possible other energy consumers.

(c) Uninterrupted energy supply is provided when usable energy is available in the system when correctly operated, also considering likely energy fluctuations.

(d) Safe removal or isolation of the energy stored within the system for safe maintenance is provided.

(e) Each energy storage device is able to withstand, without failure, the vibration, inertia loads, system loads, other structural loads and installation condition that it is subjected to in operation.

CS-23.2445 Energy system independence

Rationale for changes considering the A-NPA and the NPRM

This independence is replacing the design-specific fuel system requirements NPRM 23.930(a)(1) and pressurized systems elements requirement 23.1410(b).

Independence within multiple-energy storage and supply systems installed is provided so that a failure of any one component in one system will not result in the loss of energy storage or supply of another system.

CS-23.2450 Energy storage and supply system lightning protection

Rationale for changes considering the A-NPA and the NPRM

This requirement is aligned with the proposed system requirement on lightning protection.

For aeroplanes where the exposure to lightning is likely, 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.

CS-23.2455 Energy transfer

Rationale for changes considering the A-NPA and the NPRM

This requirement is capturing the intent of specific fuel-related requirements from NPRM 23.930.

Hazards or loss of stored energy caused by energy transfer between interconnected energy storage devices or by return flow must be avoided in normal operation.

CS-23.2460 Energy storage

Rationale for changes considering the A-NPA and the NPRM

This requirement is capturing the intent of specific fuel-related requirements from NPRM 23.930(b)(4).

The energy storage system must accommodate at least such a minimum amount of energy necessary for safe operation.

CS-23.2465 Energy storage and supply systems installation

Rationale for changes considering the A-NPA and the NPRM

This requirement is capturing the intent of specific fuel-related requirements from NPRM 23.930. The proposed (a)(4) covers filters getting clogged (normal operation) as well as likely failures.

(a) Each energy storage and supply system must be installed in such a way to:

(1) Avoid hazard to occupants or other persons due to damage to the storage during landing, taking into account partial or full retracted landing gear;

(2) Be protected against hazards due to unintended temperature influence;

(3) Be isolated to avoid hazard to occupants; and

(4) allow continued energy supply in normal operation, and in case of a likely component failure.

(b) Likely omissions during ground handling of the aircraft must not lead to a hazardous loss of stored energy.

CS-23.2470 Energy medium pollution within storage and supply system

Rationale for changes considering the A-NPA and the NPRM

This requirement is capturing the intent of specific fuel-related requirements from NPRM 23.930.

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.

CS-23.2475 Energy storage filling/charging

Rationale for changes considering the A-NPA and the NPRM

This requirement is capturing the intent of specific fuel-related requirements from NPRM 23.930.

(a) Filling/charging points must be designed to avoid wrong filling or charging.

(b) Filling/charging points must be designed to reasonably avoid the possibility of contamination of the energy stored during likely operation.

(c) Hazards to aeroplane or personnel because of filling/charging must be avoided.

CS-23.2480 Energy dump systems

Rationale for changes considering the A-NPA and the NPRM

This requirement is capturing the intent of specific fuel-related requirements from NPRM 23.930.

Energy dump systems must be free from hazards to the aircraft or its operation, considering any probable single malfunction under likely operating conditions.

CS-23.2485 Powerplant information

Rationale for changes considering the A-NPA and the NPRM

Consistently throughout the NPA, each subpart has a requirement specifying WHAT information should be established, while the presentation to the pilot or end-user is captured in Subpart G — FLIGHT CREW INTERFACE AND OTHER INFORMATION.

(a) The following powerplant information is established:

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

(2) The need for instrument markings or placards;

(3) Any additional information necessary for the safe operation of the aeroplane;

(4) Inspections or maintenance to assure continued safe operation;

(5) Information related to the air intake configuration;

(6) Techniques and associated limitations for engine starting and stopping; and

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

(b) Unless failure of an automatic thrust or drag augmentation system is 'extremely remote', information related to the availability of the system is provided.

SUBPART F — SYSTEMS AND EQUIPMENT

CS-23.2500 General requirements on systems and equipment function

Rationale for changes considering the A-NPA and the NPRM

These requirements are adopted from the NPRM; however, (a)(1) does not state 'non-required', since this would create ambiguity of what are required equipment and systems. In the end, all equipment and systems need to be covered by either (a) or (b).

(a) The equipment and systems whose function or failure would have a direct effect on the aeroplane safe operation in the intended kinds of operations (day VFR, night VFR, IFR) must be designed and installed to:

(1) Meet the level of safety applicable to the certification and performance level of the aeroplane in accordance with CS 23.2510; and

(2) Perform their intended function throughout the operating and environmental limits specified by the applicant.

(b) The systems and equipment not covered by CS-23.2500(a), considered separately and in relation to other systems, must be designed and installed so their operation or failure does not have an adverse effect on the aeroplane or its occupants.

CS-23.2505 Function and installation

Rationale for changes considering the A-NPA and the NPRM

The NPRM included in 23.1305 a number of crew interface requirements ((a)3), (b) and (c)) that have been moved to that particular Subpart G. A requirement for distributing accessories driven by engines, originally from the powerplant section, has been introduced here and will require appropriate AMC to identify what configurations are to be considered as 'multi engines'.

(a) Each item of installed equipment is of a kind appropriate to its intended function and installed according to limitations specified for that equipment.

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

CS-23.2510 Equipment, systems, and installations

Rationale for changes considering the A-NPA and the NPRM

The first sentence from the NPRM is included as, in essence, captures the same intent as that of the A-NPA and assures that when there are specific requirements elsewhere in the rule, they are not overruled by this otherwise generally applicable requirement.

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.

It is also suggested to show the inverse relationship between probability and severity in an illustration.

The definitions of probability terms are drafted in a way that allows their use also outside 'failure conditions'. The proposed matrix of severity of failure conditions and effects in the A-NPA is not kept because it is considered too detailed for the rule.

(a) For any aeroplane system or equipment whose failure or abnormal operation has not been specifically addressed by another requirement in this certification specification, the applicant must:

(1) Examine the design and installation of aeroplane systems and equipment, separately and in relation to other aeroplane systems and equipment to determine:

(i) If a failure would prevent continued safe flight and landing; and

(ii) If any other failure would significantly reduce the capability of the aeroplane or the ability of the flight crew to cope with adverse operating conditions.

(2) Design and install each system and equipment, examined separately and in relation to other aeroplane systems and equipment, to follow the probability and the severity of failure condition effects, as shown in Figure 1. The severity of a failure condition is determined by the highest effect on aeroplane, passengers or crew.

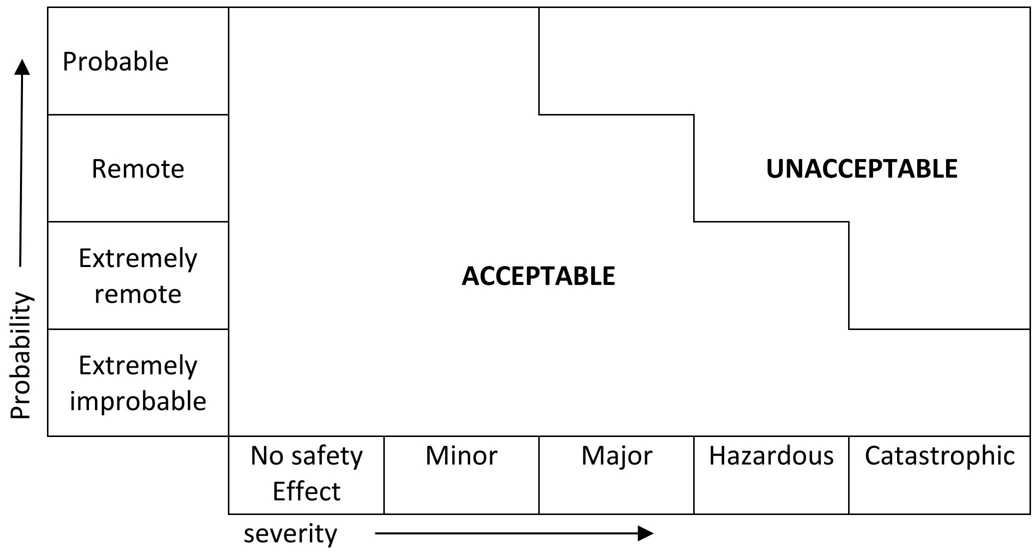

Figure 1: Relationship between probability and severity of failure condition effects

(b) The failure condition probability terms used in CS 23.2510(a) are defined as follows:

(1) 'Extremely improbable' are those so unlikely that they are not anticipated to occur during the entire operational life of all aeroplanes of one type;

(2) 'Extremely remote' are those not anticipated to occur to each aeroplane during its total life but which may occur a few times when considering the total operational life of all aeroplanes of the type;

(3) 'Remote' are those unlikely to occur to each aeroplane during its total life, but which may occur several times when considering the total operational life of a number of aeroplanes of the type; and

(4) 'Probable' are those anticipated to occur one or more times during the entire operational life of each aeroplane.

CS-23.2515 Electrical and electronic system lightning protection

Rationale for changes considering the A-NPA and the NPRM

The proposal from the NPRM to make this applicable to IFR is not supported because the risk of lightning is not related to the type of operation but to the meteorological conditions. It would also not allow the use of detection systems that could be used to avoid thunderstorms. EASA proposes to consider removal of the link to IFR to differentiate between VFR, IFR, VMC, and IMC. This also allows credit to be taken for systems that allow thunderstorms to be avoided in a reliable way, making exposure unlikely. Details should be defined by the AMC.

For an aeroplane where the exposure to lightning is likely:

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

(1) The aeroplane system level function continues to perform during and after the time the aeroplane is exposed to lightning; and

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

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

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

Rationale for changes considering the A-NPA and the NPRM

The proposal from the NPRM is followed for harmonisation. VLA is adequately covered, as HIRF effects on VLA aircraft are not likely to prevent safe flight and landing, considering their operational and performance window.

(a) Electrical and 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:

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

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

(b) For aeroplanes approved for IFR operations, the applicant must design and install 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, so the function recovers normal operation in a timely manner after the aeroplane is exposed to the HIRF environment.

CS-23.2525 System power generation, storage, and distribution

Rationale for changes considering the A-NPA and the NPRM

The proposal from the NPRM is followed except for the specific endurance times related to the operating ceiling. These would limit typical usage of the aircraft (e.g. electric propulsion aeroplanes used for local training flights), and other design solutions for possible assistance systems to safely get fast to the ground quickly. Instead of the specific numbers, the safety intent (to be able to make a safe flight and landing) is used. AMC shall define the aircraft and system-specific times, as adequate.

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

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

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

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

CS-23.2530 External and cockpit lighting

Rationale for changes considering the A-NPA and the NPRM

The proposal from the NPRM is followed for harmonisation, except for references to typical US rules that are replaced by the more general applicable wording 'operational rules'. The requirement for riding lights is not supported since this is a boating rule, not an aviation requirement.

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

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

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

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

CS-23.2535 Safety equipment

Rationale for changes considering the A-NPA and the NPRM

The proposal from the NPRM is followed for harmonisation, except that operational rules are not included in this chapter.

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

CS-23.2540 Pressurised systems elements

Rationale for changes considering the A-NPA and the NPRM

The proposal from the NPRM is followed for harmonisation, except that the requirement for system distribution across different engines is removed and now covered in the systems 'function and installation' requirement (23.2505(b)).

(a) The minimum burst pressure of hydraulic systems must be at least 2.5 times the design operating pressure. The proof pressure must be at least 1.5 times the maximum operating pressure.

(b) The minimum burst pressure of cabin pressurisation system elements must be at least 2.0 times, and proof pressure must be at least 1.5 times, the maximum normal operating pressure.

(c) The minimum burst pressure of pneumatic system elements must be at least 3.0 times, and proof pressure must be at least 1.5 times, the maximum normal operating pressure.

(d) Other pressurised system elements must have pressure margins that take into account system design and operating conditions.

CS-23.2545 Installation of recorders (e.g. cockpit voice recorders and flight data recorders)

Rationale for changes considering the A-NPA and the NPRM

Although it is acknowledged that the FAA proposes to keep the numbering of the voice and data recording requirements unchanged because of their reference in other regulations, the proposed unchanged content is design-specific and detailed and not providing the safety intent. This is not achieving the goal of this reorganisation of CS-23/Part 23 to make the rules design-independent and stable for the next 20 years. The following installation objectives are therefore proposed that are also valid for combined or future image recorders, if required.

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

(a) Is installed to meet the applicable operating rules;

(b) Meets the applicable technical specifications for both, system design and installation;

(c) Is installed so as to ensure accurate and intelligible recording and safeguarding of the required data; and

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

SUBPART G — FLIGHT CREW INTERFACE AND OTHER INFORMATION

CS-23.2600 Flight crew compartment

Rationale for changes considering the A-NPA and the NPRM

Compared to the NPRM 23.1500(a), details of the duties have been removed. The term 'pilot' is replaced by 'flight crew' for consistency with the other requirements in this certification specification. The intent of this requirement is to cover the cockpit environment, while the way how information is provided is covered by 23.2605.

A new (c) has been introduced that splits out part of what was covered in the NPRM in (b).

The new (d) covers the crew interface issues from NPRM 23.755(a)(2).

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

(b) The applicant must install flight, navigation, surveillance, and powerplant controls and displays so that a qualified flight crew can monitor and perform all tasks associated with the intended functions of systems and equipment.

(c) The flight crew interface system and equipment design must make the possibility that a flight crew error could result in a catastrophic event highly unlikely.

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

CS-23.2605 Installation and operation information

Rationale for changes considering the A-NPA and the NPRM

While 23.2600 addresses in general how the cockpit should be arranged, this requirement covers how information should be provided. It covers, for instance, the NPRM 23.1400 and 23.1505.

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

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

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

CS-23.2610 Flight, navigation, and powerplant instruments

Rationale for changes considering the A-NPA and the NPRM

Consistently throughout the NPA, each subpart that has a requirement specifying WHAT information should be established; this requirement captures HOW it should be provided.

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

(1) Parameters and trends, as needed for normal, abnormal, and emergency operation; and

(2) Limitations unless limitation will not be exceeded under all intended operations.

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

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

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

(c) Indication systems related to the propulsion energy supply must indicate to the flight crew when energy supply cannot be ensured for maximum engine power under all likely operating conditions.

CS-23.2615 Cockpit controls

Rationale for changes considering the A-NPA and the NPRM

Consistently throughout the NPA, each subpart that has a requirement specifying WHAT information should be established; this requirement captures HOW it should be provided.

(a) Cockpit controls are designed so that their operation is logical and consistent with acceptable conventions.

(b) Cockpit controls essential to safe operation must:

(1) Be obvious in function and located and identified to provide convenient operation and to prevent confusion and inadvertent operation;

(2) Be located and arranged so that the pilot, when seated and restrained, has full and unrestricted movement of each control without interference; and

(3) Provide for accurate and consistent operation.

(c) In addition, powerplant controls are located to prevent confusion as to the engines they control.

(d) In addition, propulsion energy supply:

(1) Controls are visible to the pilot in the normal flying position;

(2) Indicates the ‘off’ or ‘closed’ position with the use of the colour red; and

(3) Indicates emergency shut-off controls with the use of the colour red, if equipped.

CS-23.2620 Instrument markings, control markings, and placards

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

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

(c) The applicant must clearly mark each cockpit control, other than primary flight controls, as to its function and method of operation.

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

CS-23.2625 Aeroplane flight manual

Rationale for changes considering the A-NPA and the NPRM

The proposal from the NPRM is followed for harmonisation.

(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.

CS-23.2630 Instructions for continued airworthiness (ICA)

Rationale for changes considering the A-NPA and the NPRM

The proposal from the NPRM is not followed because the details should not stay in Appendix A as part of the rule, but should be covered by a standard. The obligations of the applicant to provide the ICA prior to delivery is not considered as a technical requirement and should be covered by the certification procedure in Part-21 or its AMC, similar to requirements regarding the certification plan.

The essential intention of Appendix A is covered by (b) and (c).

The new (d) is introduced to cover the information determined in Subpart C — Structures. (Ref 23.2255(a))

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

(b) If instructions for continued airworthiness are not supplied by the manufacturer of an appliance or product installed in the aeroplane, the instructions for continued airworthiness for the aeroplane must include the information essential to the continued airworthiness of the aeroplane.

(c) The instructions for continued airworthiness must contain a section titled 'airworthiness limitations' that is segregated and clearly distinguishable from the rest of the document. This section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure required for type certification. This section must contain a legible statement in a prominent location that reads: 'The airworthiness limitations section is approved and variations must also be approved.'

(d) The applicant must develop and implement procedures to prevent structural failures due to foreseeable causes of strength degradation, which could result in serious or fatal injuries, loss of the aeroplane, or extended periods of operation with reduced safety margins. The Instructions for Continued Airworthiness must include procedures developed under 23.2255.

6. AMC to CS-23

AMC 23.1 Purpose and scope

These AMC provide the acceptable means to show compliance of products with the requirements of CS-23 — Amendment 5 (ED Decision 2016/…/R)(CS-23)

AMC No 1 to CS-23 (CS-23 — Amendment 4)

The Certification Specifications and Acceptable Means of Compliance for Normal, Utility, Aerobatic, and Commuter Category Aeroplanes (ED Decision 2015/018/R) are considered an acceptable means to show compliance with CS-23 — Amendment 5 (ED Decision 2016/…/R)(CS-23) within the scope as defined in CS 23.1 'Applicability' and CS 23.3 'Aeroplane categories'.

AMC No 2 to CS-23 (CS-VLA Amendment 1)

The Certification Specifications and Acceptable Means of Compliance for Very Light Aeroplanes CS-VLA (ED Decision 2009/003/R) are considered an acceptable means to show compliance with CS-23 — Amendment 5 (ED Decision 2016/…/R)(CS-23) within the scope as defined in CS-VLA 1 'Applicability' and CS-VLA 3 'Aeroplane categories'.

AMC No 3 to CS-23 (ASTM Consensus standards)

The following referenced ASTM International F44 standards at the indicated revision level and, if applicable, amended as provided in this AMC No 3 are acceptable means of compliance to show compliance with CS-23 — Amendment 5 (ED Decision 2016/…/R)(CS-23).

NPA remark:

In order to allow the public to perform a review of the consensus standards, it has been requested that ASTM International make these F44 standards publically available during the EASA NPA 2016-05 consultation period. These standards can be viewed at the following address:

ASTM F44 draft standards