



European Union Aviation Safety Agency

Comment-Response Document (CRD) 2021-11

RELATED: NPA 2021-11 & ED DECISION 2023/001/R — RMT.0712
27.1.2023

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1. Summary of the outcome of the consultation

Please refer to Section 2.4 of the Explanatory Note to ED Decision 2023/001/R.



2. Individual comments and responses

In responding to the comments, the following terminology is applied to attest EASA's position:

- (a) **Accepted** — EASA agrees with the comment and any proposed change is incorporated into the text.
- (b) **Partially accepted** — EASA either partially agrees with the comment or agrees with it but the proposed change is partially incorporated into the text.
- (c) **Noted** — EASA acknowledges the comment, but no change to the text is considered necessary.
- (d) **Not accepted** — EASA does not agree with the comment or proposed change.



CRD table of comments, responses and resulting text

(General Comments)	-
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comment 3 comment by: *AOPA Sweden*

Stockholm 21-10-27

From AOPA Sweden

AOPA Sweden do not have any comments on the NPA 2021-11 other than, as usual, the costs must be limited.

AOPA Sweden
Fredrik Brandel
member of the board

response Noted

The comment from SE is noted.

comment 5 comment by: *LBA*

LBA comment:

It should be checked if it is necessary to update the EASA SEI list due to differences compared to the related FAA rules.

response Noted

The EASA SEI list is under review and any differences that are created will be included.

comment 9 comment by: *Bell*

Bell comments are included with comments provided by GAMA.

response Noted

EASA has reviewed the comments from GAMA.

comment 11 comment by: *Jari LYYTINEN*

The Finnish Transport and Communications Agency is supporting Option 2.

response Noted



The support from the Finnish Transport and Communications Agency is welcome.

comment	12	comment by: <i>FOCA Switzerland</i>
	<p>The Federal Office of Civil Aviation (FOCA) in Switzerland thanks the EASA for the opportunity to comment on this NPA 2021-11.</p> <p>FOCA has no comment.</p>	
response	<p>Noted</p> <p>The input from FOCA is welcome.</p>	

comment	13	comment by: <i>Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)</i>
	<p>Thank you for the opportunity to comment on NPA 2021-11 Enhancement of the safety assessment processes for rotorcraft designs. Please be advised that there are no comments from the Swedish Transport Agency.</p>	
response	<p>Noted</p> <p>The input from the STA is welcome.</p>	

comment	14	comment by: <i>GAMA</i>
	<p>The General Aviation Manufacturers Association (GAMA) greatly appreciates the opportunity to provide comments on NPA 2021-11. The comments below were developed and agreed by the joint GAMA/ASD-Europe Rotorcraft (RTR) committee, comprising all the major civil rotorcraft OEMs from the EU, USA and Canada.</p> <p>GAMA's staff remain at the Agency's disposal at any time if there are any questions regarding any of the comments provided below.</p>	
response	<p>Noted</p> <p>The input from GAMA is welcome and the comments have been reviewed accordingly.</p>	

comment	15	comment by: <i>GAMA</i>
	<p>GAMA applauds EASA for embracing the safety continuum to levy levels of certitude that are more appropriate for CS-/Part 27 rotorcraft. We believe this will help enhance safety of the fleet by enabling safety enhancing technology.</p>	
response	<p>Noted</p>	



EASA acknowledges the support of GAMA to this activity.

comment

66

comment by: *Garmin International*

Garmin applauds EASA for embracing the safety continuum to levy levels of certitude that are more appropriate for Part 27 Rotorcraft. We believe this will help enhance safety of the fleet by enabling safety enhancing technology.

response

Noted

EASA acknowledges the support of GAMA to this activity.

comment

69

comment by: *Civil Aviation Authority the Netherlands*

No comments on this NPA from the Netherlands Ministry of Infrastructure and Water Management / Civil Aviation Authority the Netherlands.

response

Noted

The input from NL is welcome.

comment

70

comment by: *UK CAA*

Page Number: General comment

Comment:

It is implied (by the mention of 'state of the art' in a number of places) that safety assessment methods have somehow taken a leap forward, but this is not explained or substantiated. Any meaningful safety assessment must ultimately be based on failure rates and consequences. It is therefore unclear what changes could have taken place that would justify the proposals.

Justification:

It is proposed that only substantiated claims are used as a basis for rule changes.

Proposed Text:

It is advised to either explain and substantiate the assertion or remove it.

response

Not accepted

The term 'state of the art' is only used two times in the whole document. This term is



used to describe the current methodology that is used by partner authorities and widely acknowledged by industry. Therefore, the intent was to describe that the CSs would be brought up to date. There is no intent to republish the NPA.

comment

71

comment by: UK CAA

Page Number: General comment

Paragraph No: General

Comment:

It is suggested that safety assessment requirements are standing in the way of the introduction of safety enhancing technologies, but no examples or evidence is presented.

Justification:

It is proposed that only substantiated claims are used as a basis for rule changes.

Proposed Text:

Specific examples should be presented in the NPA. This could include experience from fixed wing counterparts which this proposal seeks to align with, should there be corresponding changes resulting in the introduction of new, safety enhancing equipment/systems that have been demonstrated to be effective.

response

Not accepted

It is widely recognised that the cost of certification, due to stringent safety objectives, is a driver for the cost of developing and installing safety enhancing equipment such as autopilots and situational awareness equipment. This was recognised by the FAA with their Safety Continuum Policy Statement. The provision of specific examples would not strengthen the case for more proportionate safety objectives and would restrict the imagination of what could be possible. Likewise, a specific case study for a particular safety enhancing technology would be of limited benefit in terms of justification as it would only apply to that technology and a particular type. There is no intent to republish the NPA.

comment

72

comment by: UK CAA

Page No: General

Paragraph No: General

Comment:



It is fairly certain that the weakening of the safety assessment regime will reduce costs to aircraft manufacturers, but there is no guarantee that it will lead to the introduction of safety enhancing technology. On the contrary, it could result only in a watering down of safety standards.

Justification:

The CAA considers it irrational and unwise to risk reducing safety standards (which are arguably already too low - hence EHEST, the UK CAA's onshore review (CAP 1864) and other more recent initiatives) based on the hope that a heavily cost-driven industry will voluntarily introduce safety enhancements that will increase the cost of their products.

Proposed Text:

The CAA recommends introducing cost-effective safety enhancements to counterbalance any weakening of the rules to ensure that overall safety is at least maintained and, preferably, improved.

Alternatively, consideration should be given to reconfiguring the rules such that safety enhancements are reviewed on a case-by-case basis whereby the safety assessment criteria are relaxed only where an overall safety enhancement can be demonstrated.

response

Noted

The introduction of proportionality for small rotorcraft is part of a wider approach and aligns with the CS-23 approach.

comment

73

comment by: UK CAA

Page No: General

Paragraph No: General

Comment:

The NPA does not discriminate between different uses of the aircraft. Lower standards may be acceptable for GA but arguably not for CAT operations.

Justification:

Precedents exist for higher standards being required for CAT operations relative to GA.

Proposed Text:

It is recommended the NPA should consider applying the safety continuum concept to the type of operation for which the aircraft is to be used.



response Noted.

EASA has introduced operational limitations for Class I to VFR only. The link to the operational limitations is also provided through the differentiation between CAT A /non-CAT A. For CAT A, EASA requires the highest safety standards.

1. About this NPA

p. 3

comment 6 comment by: IFA

There is much to be welcomed in respect of the intent of this NPA to apply a proportionate approach and increase harmonisation across rotorcraft rules. It is clear that the rules need to address a wide range of differing rotorcraft design and production.

response Noted

The support of IFA is welcome.

comment 8 comment by: 34dfdfg

Attachment [#1](#)
dfgfdgdf

response Noted

The comment is not relevant to this NPA.

comment 76 comment by: Airbus Helicopters

Airbus Helicopters has provided 36 comments on the NPA 2021-11 that have been integrated into the ASD/GAMA rotorcraft committee submitted comments.

response Noted

The comments from GAMA have been reviewed.

2.1. Why we need to amend the rules - issue/rationale

p. 4

comment 16 comment by: GAMA

Third paragraph includes the sentence “These subclasses are used for establishing the certification standards for systems and equipment.” The subclasses are used to establish the safety objectives. The Certification Standards are the same regardless of class.



response

Suggested Resolution:

The sentence should read: “These subclasses are used for establishing the safety objectives for systems and equipment.”

Not accepted

The proposed text is correct and would improve the clarity of this statement. However, EASA does not re-publish an NPA unless there are fundamental errors in the NPA itself.

comment

93

comment by: *Transport Canada Civil aviation*

Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**
<p>In section 2.1 EASA highlighted that the FAA NPRM proposed to remove the distinction between Category A and B. The NPA states: Remove the distinction between category A and category B rotorcraft since the technologies and associated failure effects are similar across both categories). In Section 2.3 (page 7), EASA highlighted differences between the US and European operational context. Category A vs category B is supposed to distinguish between different operational situations. The effects of certain failure conditions may be considered more significant during category A operations than the same failure condition occurring during category B operations. For class IV rotorcraft, the only distinction is Cat A which may create issues for different manufacturers, types of operations, and regional operating rules. Perhaps the criteria for class IV should be expanded.</p>	<p>Consider adding additional criteria for class IV, such that Category A is not the only criteria for entry. Is the EASA intention to limit Category A operations to class IV aircraft only?</p>	<p>Suggestion</p>	<p>Substantive</p>

response

Noted

The removal of the distinction between CAT A and B is applicable to CS-29 rotorcraft in CS 29.1309, whereas the remark in Section 2.3 about the different operational context between the US and the EU refers to CS-27 rotorcraft. It is acknowledged that a failure condition may be categorised depending on the type of operation (i.e. CAT A or B) and this is not challenged in the NPA. If a CS-27 rotorcraft is intended to be certified and operated under CAT A, there is no change to today's system safety objectives in CS 27.1309, hence no impact for manufacturers is expected. CAT A operations are accepted only for class IV aircraft.



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

p. 5

comment

17

comment by: GAMA

While assessment level 1 for CS23.1309 includes aeroplanes that are VFR (including those that would have been CS-VLA), there is no restriction that an assessment level 1 aeroplane must be VFR. Restricting class 1 to VFR means that any rotorcraft that would otherwise meet the class 1 criteria would also have to meet class 2 requirements. This will make IFR equipage harder for these rotorcraft compared to their FAA equivalent. US accident statistics show that VMC operators who inadvertently encounter IMC will likely lose control of the rotorcraft and perish within an average of 56 seconds. It seems that safety would be better enhanced by enabling these vehicles to be more easily equipped.

response

Not accepted

For Class I, an additional limitation 'VFR Only' has been introduced. An IFR helicopter will have to be at least considered as a Class II. However, the objectives are more proportionate than they currently are thus facilitating the introduction of more IFR-certified rotorcraft.

Why we restrict CS-27 Class I to VFR only?

The differentiation between the classes of small rotorcraft is based on a combination of technical and operational criteria. This forms a continuum on which EASA associates proportionate safety objectives. The operational criteria are; the category of operation (CAT-A/ Non-CAT-A which on the basis of the OPs Regulation (965/2012) enable some type of operations) and the flight rules (VFR/IFR). The safety objectives are proportionate to the risk of the operation and the flight environment.

The objectives for a small 2-seater light rotorcraft are, for consistency, aligned with CS-23 Assessment Level I of products which have perceived similar risk levels and operations. The risk levels are low because of the limit on these products to VFR operations only (day/night).

IFR operation for 2-seater light rotorcraft represents a higher risk because of the intrinsic lower stability of a light rotorcraft compared to a fixed wing aircraft and the lower IFR minimum for rotorcraft (SERA). This higher operational risk leads to the need for a rotorcraft that is certified for IFR operations to have to demonstrate slightly higher safety objectives (one order of magnitude for the minimum acceptable probabilities of failures). In addition, leisure or sight-seeing flights requires external visibility and therefore are conducted in VFR conditions. Rotorcraft operations which necessitate IFR capability are already more challenging and could not be considered as an entry level product. Therefore, the lowest-level of IFR-capable rotorcraft was set to Class II.

However, even if Class II safety objectives are required (e.g 10⁻⁷ for a Catastrophic Failure Condition), these safety objectives are still more proportionate than those in the



current version of the AMC 27.1309 and will facilitate the certification of IFR-capable rotorcraft (which are currently set at 10-9 for a Catastrophic Failure Condition).

comment

67

comment by: *Garmin International*

Section 2.3 Introduction of AMC 27.1309 Definition of classes Page 6:

While assessment level 1 for CS23.1309 includes aeroplanes that are VFR (including those that would have been CS-VLA), there is no restriction that an assessment level 1 aeroplane must be VFR. Restricting class 1 to VFR means that any rotorcraft that would otherwise meet the class 1 criteria would also have to meet class 2 requirements.

This will make IFR equipage harder for these rotorcraft compared to their FAA equivalent. US accident statistics show that VMC operators who inadvertently encounter IMC will likely lose control of the rotorcraft and perish within an average of 56 seconds. It seems that safety would be better enhanced by enabling these vehicles to be more easily equipped.

response

Not accepted

See response to comment #17.

comment

81

comment by: *FAA*

Paragraph Number	Referenced Text	Comment/Rationale or Question	Proposed Resolution
2.3	3rd paragraph: A requirement that a catastrophic failure condition shall not result from a single failure has been introduced.	The FAA NPRM does not introduce this 'no-single failure' concept nor do we wish to include it. The other references to FAA guidance were not intended to include this language in the regulation but to provide some clarity for applicants.	Remove the requirement to highlight 'no-single failure' concept from the proposed language.

response

Not accepted

Equivalent text can be found in the FAA AC 27-1B and the FAA policy statement 'At rotorcraft function level, no single failure will result in a Catastrophic Failure Condition.' This requirement is introduced in all type of products by EASA. The introduction of more proportionate safety objectives is compensated by the introduction of this requirement.



comment	<p>85 comment by: <i>Leonardo Helicopters</i></p> <p>(page 5, 2.3 - How we want to achieve it [...], last paragraph)</p> <p>After the statement ..."A requirement that a catastrophic failure condition shall not result from a single failure has been introduced.", it should be useful to highlight that the CS 27/29.602 remain applicable to avoid misunderstanding.</p> <p>For example: "A requirement that a catastrophic failure condition shall not result from a single failure has been introduced (Note that CS 27/29 602 (a) remains applicable)."</p>
response	<p>Not accepted</p> <p>It is recognised that Section 2.3 does not contain the full technical details of the changes in Section 3. However, EASA does not republish NPAs unless there is a fundamental error in the NPA.</p>

comment	<p>94 comment by: <i>Transport Canada Civil aviation</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Comment summary</th> <th style="width: 15%;">Suggested resolution</th> <th style="width: 15%;">Comment is an observation or is a suggestion*</th> <th style="width: 10%;">Comment is substantive or is an objection**</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <p>The NPA states: In the context of safety assessment, the differentiation between single-engine and multi-engine rotorcraft has been removed... Complex and integrated systems with high criticality might be installed on small rotorcraft irrespective of the number of engines. Since this NPA effectively applies to the entire aircraft, there are still some systems/functionality that will always have additional safety benefits for dual engine aircraft. In this context it would seem the differentiation between single and dual engine cannot be universally be removed. TCCA concurs with the EASA proposal to remove the reference to the type of engine and make the classes more technology agnostic.</p> </td> <td style="vertical-align: top;"> <p>Consider including the number of engines as a factor in safety assessment, and/or within the different class of aircraft defined in the safety continuum.</p> </td> <td style="vertical-align: top;"> <p>Suggestion</p> </td> <td style="vertical-align: top;"> <p>Substantive</p> </td> </tr> </tbody> </table>	Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**	<p>The NPA states: In the context of safety assessment, the differentiation between single-engine and multi-engine rotorcraft has been removed... Complex and integrated systems with high criticality might be installed on small rotorcraft irrespective of the number of engines. Since this NPA effectively applies to the entire aircraft, there are still some systems/functionality that will always have additional safety benefits for dual engine aircraft. In this context it would seem the differentiation between single and dual engine cannot be universally be removed. TCCA concurs with the EASA proposal to remove the reference to the type of engine and make the classes more technology agnostic.</p>	<p>Consider including the number of engines as a factor in safety assessment, and/or within the different class of aircraft defined in the safety continuum.</p>	<p>Suggestion</p>	<p>Substantive</p>
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response	<p>Noted</p> <p>In the past it was assumed that complex and integrated systems and functions would not be employed in single-engine rotorcraft, i.e. the hazard from rotorcraft systems for the overall aircraft safety was considered lower for single-engine rotorcraft. The</p>								



differentiation between single and multi-engine is only removed in the context of CS 27.1309, i.e. specific requirements for multi-engine rotorcraft remain unchanged. For the safety assessment process, it is assumed that the same methodology shall be applied irrespective of the number of engines. The differentiation between single and multi-engine rotorcraft was deemed not needed any more.

CS 27.1309 Equipment, systems, and installations

p. 9

comment

18

comment by: GAMA

About the wording : "Equipment and systems required to comply with type-certification requirements, airspace requirements or operating rules, ..." :
The definition of 'required / not required' equipment/system and the definition of equipment should be clarified.

Suggested Resolution:

A Guidance Material GM 27-1309(a) should propose examples of 'required / not required' equipment/system and the definition of equipment.

response

Not accepted

In this context the term 'required' relates to the fact that the equipment or system is required to be compliant with the CS-27 requirements, airspace requirements or operating rules. It does not mean that the equipment or system is required (or not required) to be included in the design. Detailed guidance on the 'applicability' of CS 27.1309 to equipment and systems can already be found in the proposed AMC 27.1309 under the heading 'Applicability'. The applicability for rotor drive systems will be updated for clarification.

comment

19

comment by: GAMA

About the wording "...required to comply with type-certification requirements, airspace requirements or operating rules..." :
The idiom "airspace requirements" is ambiguous. Such requirements may address equally ground segment and airborne systems. It is assumed that "airspace requirements" address the Surveillance Performance and Interoperability (SPI IR) and associated Easy Access Rules CS-ACNS. The 27.1309(a) proposal is beyond Basic Regulation Essential requirements for airworthiness ANNEX II 1.3.2.
They are many regulations about airspace requirements including interoperability regulations.

Suggested Resolution:

The regulations about airspace requirements that EASA refers to should be clarified



response	<p>Noted</p> <p>The wording is identical to CS-23 and SC-VTOL, which were publicly consulted and is aligned with Part 23. The ground segment is not within the scope of CS 27.1309. As correctly noted, the applicable requirements can be found in CS-ACNS.</p>
comment	<p>20 comment by: GAMA</p> <p>There seems to be a logic flaw in the sentence about systems whose improper functioning would lead to a hazard. Indeed, CS 27.1309(a) excludes systems whose improper functioning would lead to a hazard. CS 27.1309(c) addresses systems not covered by (a), ie. it covers systems whose improper functioning do not lead to a hazard. CS 27.1309(c) requires that those systems, whose improper functioning not leading to a hazard, must not cause a hazard. This is a faulty logic condition, since a system cannot cause a hazard if its improper functioning does not lead to a hazard. For systems that are not required, either by CS or operating/airspace rules, the demonstration of proper functioning as intended for the system function will be performed iaw CS xx.1301 (d)</p> <p>Suggested Resolution: It is proposed to remove the following wording : ", or whose improper functioning would lead to a hazard,"</p>
response	<p>Not accepted</p> <p>There is no logical problem with CS 27.1309(a) and CS 27.1309(c). CS 27.1309(a) is concerned with the malfunction of non-required equipment (i.e. if the malfunction of the system creates a hazard, it must be considered in 1309(b)). CS 27.1309(c) refers to the normal operation of non-required equipment (e.g. the normal operation of the coffee maker or refrigerator shall not create a hazard).</p>
comment	<p>21 comment by: GAMA</p> <p>The wording "limits" is not adequate regarding operations, indeed, limits are not certified whereas an envelope is so where the helicopter can be flown safely</p> <p>Suggested Resolution: Replace "limits" by "operating and environmental envelope". As an alternative, replace "limits" by "operating and environmental limitations" in order to be consistent with the subpart G</p>
response	<p>Accepted</p> <p>The text has been amended in order to replace the word 'Limits' with 'conditions'.</p>



comment	22	comment by: GAMA
<p>About operating rules, Operating requirements do vary depending on the state of the operators. EASA should clarify which referential is used for the purpose of type certification when based on this new CS x.1309. Indeed the TCH must be in a position to verify compliance at the time of declaration of compliance.</p> <p>Suggested Resolution: Add an AMC content to indicate which operating and airspace requirements have to be applied with a reference to the intended (EU) regulation where the requirements have to be retrived (e.g. AIR-OPS 965/2012;(EU) No 1207/2011;(EU) No 1206/2011). The link to CS-ACNS could possibly be made here to help the manufacturer to identify the required equipment.</p>		
response	Not accepted	
<p>For the type certification, the EASA operational rules are an applicable reference for the compliance demonstration. Operational assumptions that are taken into account for CS 27/29.1309 (a) compliance demonstration, should reflect the planned type of operation.</p>		
comment	23	comment by: GAMA
<p>GAMA is concerned that the inclusion of the wording “or whose improper functioning could lead to a hazard” could be problematic. We believe we understand the rationale, but it may have unintended consequences. Take an optional system not required for certification or operations such as, an auxiliary heater for example. We would not normally care if it produced heat in every possible environment, but we do care if it presented a hazard or interfered with proper operation of any required systems. We show any failure conditions, such as in the case of the heater example, maybe a fire, was sufficiently improbable under paragraph b. We would also want to make sure that any aspect of the system that the safety analysis took credit for, such as protection mechanisms worked throughout the rotorcrafts expected environment, but the rule as written would seem to require that the system must produce heat throughout the whole environment.</p> <p>Suggested Resolution: We suggest that the phrase from the proposed paragraph (a) is removed and a separate paragraph or subparagraph is added for non-required systems. The concern is valid, but we think there will be issues as written.</p>		
response	Not accepted	
<p>This type of wording is already used in several other CSs (e.g. CS-25, CS-23). If improper functioning could lead to a hazard, consequently proper functioning must be ensured. However, it is acknowledged that the demonstration of a certain performance level of non-required equipment is not within the scope of CS 27/29.1309. (i.e. CS 27/29.1309 applies to hazards to the rotorcraft/occupants introduced by installation/presence of</p>		

the equipment). This is also clarified in the applicability paragraph of the associated AMC.

comment

24

comment by: GAMA

About the wording "and in relation to others systems" : Does it mean the combination of failures among/between systems are as well driving safety qualitative and quantitative objectives to be met ?

The extent of "and in relation to others systems" should be clarified

Suggested Resolution:

AMC should be clarified for an assessment at aircraft level and not only at system level as per ARP 4754A.

AMC should clarify that the cumulative effects are not covered by this requirement (eg., cumulation of many effects on different systems from a single failure, possibly leading to a CAT event)

response

Not accepted

The wording 'in relation to other systems' is identical to other product specifications (e.g. CS-25, Basic Regulation). Failures should not only be assessed in isolation, but also with respect to interdependencies (e.g. resource systems) and cascading effects. Cascading failures should also be assessed in the frame of a single failure and common cause considerations. This is also clarified in the paragraph 'Single failure and common cause considerations' of AMC 27/29.1309.

comment

25

comment by: GAMA

About the wording "and in relation to others systems" : Does it mean the combination of failures among/between systems are as well driving safety qualitative and quantitative objectives to be met ?

The extent of "and in relation to others systems" should be clarified

Suggested Resolution:

AMC should be clarified for an assessment at aircraft level and not only at system level as per ARP 4754A.

AMC should clarify that the cumulative effects are not covered by this requirement (eg., cumulation of many effects on different systems from a single failure, possibly leading to a CAT event)

response

Not accepted

See response to comment #24.

comment

26

comment by: GAMA



Paragraph 27.1309(b) if interpreted incorrectly can remove the possibility of a safety continuum by associating consequence with implied probabilities (e.g. catastrophic with extremely improbable and major with remote).

Suggested Resolution:

Alignment between failure effects and reliability targets are identified in the AMC based on rotorcraft Classes. Paragraph (b) could be written to associate the hazards to the safety objectives as follows:

“The equipment and systems covered by subparagraph (a), considered separately and in relation to other systems, must be designed and installed to meet the expected safety objectives such that:”

response

Not accepted

The CS 27.1309 requirement should not be read in isolation from its AMC. For all product classes the quantitative and qualitative safety objectives are identified in the AMC.

comment

27

comment by: GAMA

The statement “...or whose improper functioning would lead to a hazard,...” implies that non-essential equipment which is not required by CS-27, airspace requirements or operating rules must also perform their intended function. Non-essential equipment is covered under 27.1309(c) and clarification is provided in the AMC regarding applicability of non-essential equipment.

Optional equipment like entertainment systems, cameras, searchlights, operator consoles should function properly, but proper functioning of this type of equipment is not required and is a matter of customer satisfaction.

Note that it is recognized that the equipment must not create a hazard as required by 27.1309(c).

Suggested Resolution:

Clarify that paragraph (a) only applies to equipment required by CS-27, airspace requirements or operating rules. It is proposed that 29.1309(a) be worded as follows:

“Equipment and systems required to comply with type-certification requirements, airspace requirements or operating rules, must be designed and installed so that they perform their intended function throughout the operating and environmental limits for which the rotorcraft is certified.”

response

Not accepted

See response to comment #23.

comment

79

comment by: Thales Avionics SAS

Pages: 9, 13, 16, 18

Sections: 2.1, 2.2, CS/AMC 27.1309, CS/AMC 29.1309

Comment:



	<p>The "why and what" section (§2.1, 2.2) advocates for harmonization between EASA and FAA for FAR/CS 27.1309 and 29.1309 which is very well welcomed by the Industry. As a result, to enhance this harmonization it is recommended to keep the "No single failure requirement" in the means of compliance similar to the AC. Even if it is a practice on recent program to apply the fail safe concept, this difference between FAR and CS will potentially create confusion and result in the future in lower level of regulatory efficiency.</p>
response	<p>Noted</p> <p>It is acknowledged that the 'no single-failure criterion' introduces a regulatory difference with the FAA (at CS/Part level). However, it was decided to raise it to the level of a requirement in the CS in order to increase visibility of a requirement which has a significant effect on the architecture/design of the systems. In addition, it is deemed necessary to compensate for lower safety objectives that have been included in the different classes. It is also considered to be the current practice of the rotorcraft industry (as confirmed by a review of recent certification projects).</p>

comment	<p>95 comment by: <i>Transport Canada Civil aviation</i></p>								
	<table border="1"> <thead> <tr> <th data-bbox="386 913 820 1039">Comment summary</th> <th data-bbox="820 913 1096 1039">Suggested resolution</th> <th data-bbox="1096 913 1258 1039">Comment is an observation or is a suggestion*</th> <th data-bbox="1258 913 1421 1039">Comment is substantive or is an objection**</th> </tr> </thead> <tbody> <tr> <td data-bbox="386 1039 820 1627"> <p>The NPA states the new wording for CS 27.1309(a): (a) Equipment and systems required to comply with type-certification requirements, airspace requirements or operating rules, or whose improper functioning would lead to a hazard, must be designed and installed so that they perform their intended function throughout the operating and environmental limits for which the rotorcraft is certified. How would changes to, or regional differences between, operational rules and/or airspace requirements be addressed with reference to CS 27.1309(a)? Will an aircraft certification be specific to a defined operational rule (effective date or amendment)?</p> </td> <td data-bbox="820 1039 1096 1627"> <p>TCCA request EASA to advise how changes to operational rules and/or airspace requirements will be accommodated in the context of aircraft certification.</p> </td> <td data-bbox="1096 1039 1258 1627"> <p>Observation</p> </td> <td data-bbox="1258 1039 1421 1627"> <p>Substantive</p> </td> </tr> </tbody> </table>	Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**	<p>The NPA states the new wording for CS 27.1309(a): (a) Equipment and systems required to comply with type-certification requirements, airspace requirements or operating rules, or whose improper functioning would lead to a hazard, must be designed and installed so that they perform their intended function throughout the operating and environmental limits for which the rotorcraft is certified. How would changes to, or regional differences between, operational rules and/or airspace requirements be addressed with reference to CS 27.1309(a)? Will an aircraft certification be specific to a defined operational rule (effective date or amendment)?</p>	<p>TCCA request EASA to advise how changes to operational rules and/or airspace requirements will be accommodated in the context of aircraft certification.</p>	<p>Observation</p>	<p>Substantive</p>
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response	<p>Noted</p>								

If the operating rules/airspace rules require the use/installation of certain equipment, this equipment needs to be part of the safety assessment process in accordance with CS 27/29.1309. This is true for the initial type certification (and the operational environment for which the aircraft is certified) and for changes introduced post-TC (e.g. due to changes to operational rules requiring the installation of new equipment).

comment

96

comment by: *Transport Canada Civil aviation*

Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**
<p>CS 27.1309(a) (and CS 29.1309(a) on page 17) use the term “improper functioning”. However, this is not defined or clarified in the guidance material.</p> <p>The ARAC for AC 25.1309-1X Arsenal specifies that the phrase “improper functioning” is intended to identify equipment and system failures which have an effect on airplane safety and are therefore failure conditions.</p>	<p>Consider adding content in the guidance material that improper functioning refers to failures and therefore includes both loss of function and malfunction.</p> <p>Alternatively, change the wording in the standard to use the term “failure” instead of “improper functioning” so it aligns with other guidance material (e.g. ARP 4761, ED-135)</p>	Suggestion	Substantive

response

Not accepted

This text is standard wording that is used in other CSs. Improper functioning should be understood as a loss of function or malfunction. A definition for malfunction can be found in ARP4761.

comment

102

comment by: *Transport Canada Civil aviation*

Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**
<p>The NPA states the new wording for CS 27.1309(a):</p> <p>(a) Equipment and systems required to comply with type-certification requirements, airspace requirements or operating rules, or</p>	<p>TCCA suggest adopting the text in FAA NPRM FAA-2017-0990: “...they perform their intended functions under any foreseeable operating condition...”</p>	Suggestion	Substantive



<p>whose improper functioning would lead to a hazard, must be designed and installed so that they perform their intended function throughout the operating and environmental limits for which the rotorcraft is certified.</p> <p>It is not clear what is the intent of including the term “operating rules”. Is it to differentiate Class I rotorcraft as stated by the NPA on page 6?</p> <p>Class I rotorcraft, for which the lowest safety objectives are set, are limited to VFR operations only (day/night),</p> <p>Perhaps a more generalized term would be appropriate.</p>			
<p>response</p>	<p>Not accepted</p> <p>If the operating rules/airspace rules require the use/installation of certain equipment, this equipment needs to be part of the safety assessment process in accordance with CS 27/29.1309. Applicable requirements can be found in the Air OPS Regulation (965/2012). The suggested text from FAA NPRM relates to the environmental and operational envelope, for which the rotorcraft is certified.</p>		

3.1.1. Draft Certification Specifications p. 9

<p>comment</p>	<p>68</p> <p>Section 3.1.1 CS 27.1309(a) Page 9:</p> <p>Garmin is concerned that the inclusion of the wording “or whose improper functioning could lead to a hazard” could be problematic. We believe we understand the rationale, but it may have unintended consequences. Take an optional system not required for certification or operations such as, an auxiliary heater for example. We would not normally care if it produced heat in every possible environment, but we do care if it presented a hazard or interfered with proper operation of any required systems. We show any failure conditions, such as in the case of the heater example, maybe a fire, was sufficiently improbable under paragraph b. We would also want to make sure that any aspect of the system that the safety analysis took credit for, such as protection mechanisms worked throughout the rotorcrafts expected environment, but the rule as written would seem to require that the system must produce heat throughout the whole environment. We suggest that the phrase from the proposed paragraph (a) is removed and a separate paragraph or subparagraph is added for non-required systems. The concern is valid, but we think there will be issues as written.</p>	<p>comment by: <i>Garmin International</i></p>
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response Not accepted

See response to comment #23.

comment 82 comment by: FAA

Paragraph Number	Referenced Text	Comment/Rationale or Question	Proposed Resolution
3.1.1	(c)(1)	The additional wording "and does not result from a single failure" is listed in the proposed regulation.	Remove the wording "and does not result from a single failure."
3.1.2	Table 1	The description in the table includes Category A and B which are no longer considered in the FAA versions. Why not remove them for harmonization?	Remove the inclusion of Category A and B from the descriptions. In the case of Class IV, simply define as "same as part 29," similar to Note 4 in Table 2.
3.1.2	Single failure and common-cause consideration	This section describes an acceptable safety assessment and does not appear to add any new considerations. The FAA does not think it is necessary and may cause confusion to applicants.	Remove this section.

response Not accepted

The 'no single-failure criterion' has been added at the requirement level. This is the same for all other recently developed EASA material (e.g. SC-VTOL, SC-GAS). Since the 'no single failure' is a new criterion, it was deemed necessary to provide guidance in the AMC material (i.e. 3.1.2 single failure and common cause considerations is considered necessary to clarify EASA expectations).

Table 1 introduces the definitions for the four different rotorcraft classes, which take into account the distinction between CAT A/B. This is done for the purpose of establishing proportionate safety objectives for different rotorcraft classes. It is acknowledged that the distinction between CAT A and B in CS 29.1309 is removed, since the safety assessment process is deemed to be equivalent and does not depend on the rotorcraft category.



comment	<p>4 comment by: <i>LBA</i></p> <p>LBA comment:</p> <p>Page 13, Note 3: It should be clarified that the alleviations of ED-79A cannot be applied in addition to those listed in table 2.</p>
response	<p>Partially accepted</p> <p>Note 3 under Table 2 intends to clarify the applicability of ED-79A in terms of DAL allocation using architectural considerations. DAL allocation in accordance with ED-79A is possible for all classes, with the only exception that no FDAL D should contribute to hazardous or catastrophic failure conditions.</p>
comment	<p>10 comment by: <i>Safran Aerosystems</i></p> <p>The definitions of probability classification and severity, which can be found in AC 29-2C AC 29.1309. b) (1) and (2) respectively, are not present in the AMC 27.1309 or in AC 27.1309. The definition should be added to the AMC 27.1309 or a reference to the specific AC 29.1309 paragraph should be added.</p>
response	<p>Noted</p> <p>The definitions of probability/severity classifications are not changed with respect to FAA AC 29-2C /AC 27-1B, and AC 29/27.1309 should be used in conjunction with the newly introduced AMC 27/29.1309. This is also highlighted at the beginning of AMC 27/29.1309.</p>
comment	<p>34 comment by: <i>GAMA</i></p> <p>About the wording : "the AMC to CS-27 consists of FAA AC 27-1B Change 7, dated 4 February 2016."</p> <p>Even if AC 27-1B change 8 does not address 27.1309, by principle, the AMC should refer the latest AC change.</p> <p>Furthermore, in CS 27 Amdt 8 Book 2, AMC MG 21 about Guidance on creating a system level Functional Hazard Assessment (FHA) says :</p> <p>"The guidance contained within FAA AC 27-2C Change 7 MG 21 has been deemed by EASA to be at variance with EASA's interpretation or its regulatory system and therefore should not be considered to be EASA acceptable means of compliance."</p> <p>Why does the new AMC 27.1309 introduce the AC 27-1B change 07 ?</p> <p>Suggested Resolution: Refer the latest FAA AC 27-1B Change or remove any reference to the FAA AC 27-1B</p>



response	<p>Not accepted</p> <p>Historically EASA has adopted FAA AC 27-1B as the AMC (Book 2) to CS-27. However, in the recent past there have been amendments to AC 27-1B that do not reflect EASA's position as AMC. The last FAA AC 27-1B change that was reviewed and accepted by EASA was Change 7, therefore this is the baseline for the whole of CS-27 Book 2. If EASA does not accept a change that has been introduced into AC 27-1B, then EASA clearly states this in CS-27 Book 2 and this is the reason for the statement relating to FAA AC 27-1B MG 21. As stated in AMC 27.1309, AC 27.1309 is still valid and AMC 27.1309 amends it only where stated. Therefore, a reference to FAA AC 27-1B Change 7 is still required and cannot be deleted as suggested.</p>
comment	<p>35 comment by: GAMA</p> <p>About the wording : "CS 27.1309 is intended to be a general requirement that is applicable to any equipment or system as installed,"</p> <p>The intention of 1309(a) is to address environmental and technical features to be demonstrated for "required" equipment system and installations. The wording "any" "pushes" the discussion beyond the scope of 1309(a).</p> <p>Suggested Resolution: It is proposed to modify the sentence as follows : "CS 27.1309 is intended to be a general requirement that is applicable to any equipment or system as installed required to comply with CS 1309 (a), in addition to specific systems requirements, except as indicated below."</p>
response	<p>Not accepted</p> <p>Adding the limitation to CS 27.1309(a) would have repercussions on other parts of CS 27.1309, which were not intended. It is therefore deemed not necessary to introduce the suggested change. CS 27.1309 is by default a generic requirement that is 'applicable to any equipment or system as installed'; the more detailed scoping of applicability is then done in the sub-paragraphs.</p>
comment	<p>36 comment by: GAMA</p> <p>Paragraph (b) does not mention items required for cabin safety.</p> <p>Suggested Resolution: Clarify that CS 27.1309 does not apply to Subparts B, C, and D for aspects such as the performance, flight characteristics, structural loads, structural strength requirements and cabin safety...</p>
response	<p>Not accepted</p>

Safety equipment is addressed in AMC 27.1309(d) Subpart F. Other systems/equipment for cabin safety are within the scope of CS 27.1309 and the risk and hazards of those installations should therefore be assessed.

comment 37 comment by: GAMA

Paragraph (c)(2) does not include applicability of display of parameters, sensors, transducers similar to the AMC on (c)(1) for engines.

Suggested Resolution:

Add a statement that 1309 does apply to the equipment/systems associated with the drive system installation (e.g. display of parameters, sensors, transducers, etc.)

response Partially accepted.

The text has been amended as follows:

‘CS 27.1309 does not apply to the rotor drive systems. However, it does apply to the equipment/systems associated with the rotor drive systems (e.g. cooling and lubrication systems with their associated monitoring means, chip detection systems, rotor brake actuation and monitoring systems, VHM systems, systems usually including actuator(s) used to engage/disengage the engine(s) to/from the rotor drive systems)’

comment 38 comment by: GAMA

Subpart F :

about the sentence : "However, it does apply to hazards to the rotorcraft, its occupants, and flight crew introduced by the installation/presence of this type of equipment/systems (e.g. electromagnetic-interference considerations, fire hazards, and inadvertent deployment of emergency floatation equipment) approved as part of the type design."

Does it mean that 27.1309 is not applicable to equipment which are not part of the Type Design ?

Suggested Resolution:

Clarify whether 27.1309 is applicable to equipment which are not part of the Type Design

response Noted

The wording is equivalent to FAA AC 29/AC27.1309. The Certification Specifications apply to the type design, which is defined and certified in the Type Certification process, i.e. 27.1309 can only apply to equipment which is part of the type design.

comment 39 comment by: GAMA

About the "Safety objectives per class and failure condition classification":



	<p>AMC 27.1309 introduces a safety continuum concept (graduated scale for the certification standards for systems and equipment) with 4 classes of small rotorcraft (class I to IV) .</p> <p>This safety continuum should be mentioned as well in the rotorcraft TCDS to show which level of safety has been demonstrated.</p> <p>Suggested Resolution: Add a note below the Table 1 : "The class of the rotorcraft, as defined in table 1 of AMC 27.1309, which has been demonstrated by the applicant should be mentioned in the rotorcraft TCDS."</p>
response	<p>Not accepted</p> <p>Based on the limitations in the TCDS (weight, passengers, Category, VFR/IFR), the information on the class can be derived.</p>
comment	<p>40 comment by: GAMA</p> <p>Clarification was included in the FAA Safety Continuum Policy (PS-ASW-27-15) that dual systems of sufficient robustness would be considered to meet the 10-8 target for Class III rotorcraft. It is important to include this distinction to ensure that meeting this safety objective can be accomplished without the need for much more costly tri-plex systems.</p> <p>Suggested Resolution: Add Note 5 for Class III rotorcraft under Catastrophic failures as follows: This requirement can be met by a dual system of sufficient robustness, reliability, and independence.</p>
response	<p>Not accepted</p> <p>The AMC is supposed to be non-prescriptive. The architecture to meet the safety objectives is up to the applicant.</p>
comment	<p>41 comment by: GAMA</p> <p>ED-79A/ARP4754A is referenced as acceptable documents for demonstrating compliance to CS 27.1309 on page 12.</p> <p>The Table 2 of the AMC on page 13 assigns FDALs to a failure condition classification. Only one FDAL is assigned to a failure condition classification in Table 2. This is not in line with ARP4754A Table 3 (page 44). ARP4754A allows more than one functional member (Primary=P/Secondary=S) assigned to a failure condition classification (e.g Catastrophic => FDAL P=A/S=C).</p> <p>In order to minimize the risk that one design error may result in a catastrophic failure condition, the multiple member approach is a risk mitigation means, instead of additional verification / verification activities as recommended in Note 1 of the ARP4754A Table 3. The multiple member approach should be inserted in the AMC as well.</p>



	<p>Remark: AC 23.1309-1E is also not fully aligned to ARP4754A (Figure 2 on page 23 of AC defines a Catastrophic FDAL A/B recommendation for Class IV aircraft whereas ARP4754A recommends FDAL A/C or two independent FDAL B/B).</p> <p>Suggested Resolution: Proposal: Revise Table 2 with Primary/Secondary FDAL assignment in accordance with ARP4754A or copy table 3 of the ARP4754A into the AMC.</p>
response	<p>Not accepted</p> <p>Using architectural considerations for assigning a FDAL as described in ED79A/ARP4754A (table 3) is possible for all classes, with the only exception that no FDAL D should contribute to hazardous or catastrophic failure conditions.</p>
comment	<p>42 comment by: GAMA</p> <p>What is the relation for the alleviation to FDAL C for a system which FCs are catastrophic and the quantitative objective is $10E-7$. For instance, if an autopilot is installed, is it safe to reach a FDAL C and not B (no independence and less testing at SW level typically)? don't we diminish the usage of qualitative objective by downgrading to FDAL C for catastrophic event, it goes one level less than the net safety benefit approach proposed in CM-SA-001</p> <p>Qualitative objectives for catastrophic failure conditions in Class II should not be downgraded lower than FDAL B or the rationale for such alleviation should be document and maybe restrictions should be set.</p> <p>Besides, it should be clear to which extent or not IDAL can be further decomposed if FC CAT qualitative objective are already downgraded to FDAL C.</p> <p>Suggested Resolution: For Class I and II for FC classification as CAT, either keep FDAL B or modify the wording as follows : "FDAL C with independence required"</p>
response	<p>Not accepted</p> <p>The proportionality for the quantitative and qualitative safety objective is equivalent to other products (CS-23, SC-VTOL) and is associated with the nature and risks associated with different types of aircraft (different risk acceptance).</p> <p>For the example of Class II, that would result in a FDAL C for functions contributing to catastrophic failure conditions and a probability requirement of 10^{-7} /FH. As for all xx.1309/.2510, there is no correlation between the development assurance level and the reliability of a given system. The development assurance process is aimed at providing confidence that the likelihood of a development error is sufficiently limited.</p> <p>In addition, the 'no single-failure criterion' has been introduced for all classes, which will drive independence requirements for catastrophic failure conditions. It is</p>

acknowledged, that the proportionality introduced in CS 27.1309 is going beyond CM-SA-001 and the CM will be reconsidered once the rulemaking task is completed.

comment

43

comment by: GAMA

The second paragraph talks about “the single component, part, or element” but these have terms not been defined in relation to the single failure concept.

Suggested Resolution:

Delete references to “component, part, or element” or define how they are to be considered as part of a system (note that structure failures are not to be included).

response

Not accepted

This wording is used in other AC/AMC (e.g. 23.1309-1E) and it is not the intention to change the meaning of this wording in this AMC. Providing these definitions is not considered to add value.

comment

74

comment by: UK CAA

Page No: 10 and 17

Paragraph No: CS 27.1309(a) and CS 29.1309(a)

Comment:

Although the majority of changes specified in this NPA are there to bring CS-27 in line with the changes that have already been made to the other CS documents, it would be beneficial to note that some of the changes could be subject to misinterpretation or an overly narrow interpretation. This could result in a potential degradation of safety. An example of this is the change of wording to 1309(a). The previous text required equipment, systems and installations to perform their intended functions “under any foreseeable operating condition”. The new text requires that they perform their intended functions “throughout the operating and environmental limits for which the rotorcraft is certified”.

Justification:

It is possible that some entirely foreseeable types of failure condition, human error or simple bad luck (e.g., the need for rapid manoeuvres to avoid mid-air collision) could drive the rotorcraft outside the operating and environmental limits to which it was certificated.

Proposed Text:

Additional guidance regarding the interpretation of such statements should be considered.



response	Noted
	The new wording reflects the current state of practice. The certified operating and environmental envelope should take into account all foreseeable operating conditions with appropriate safety margins.
comment	77 comment by: <i>Thales Avionics SAS</i>
	<p>Page: 13</p> <p>Sections: §3.1.2, AMC 27.1309, Table 2, Note 1</p> <p>Comment:</p> <p>Safety objectives for quantitative analysis according to Class of rotorcraft: It is noted in AMC 27.1309 table 2 (note 1) that "The applicant is not expected to perform a quantitative analysis for minor failure conditions" whereas FAA Policy statement PS-ASW-27-15 highlights that "a qualitative analysis is allowed to justify minor and major failure conditions".</p> <p>There is no safety rationale put forward by EASA to justify such a discrepancy between EASA and FAA policies on safety continuum for rotorcraft. Qualitative analysis should be allowed to justify minor and major failure conditions.</p>
response	Not accepted
	The AMC refers to ARP4761. For the depth of analysis, ARP4761 requires quantitative analysis for major failure conditions.
comment	80 comment by: <i>Thales Avionics SAS</i>
	<p>Pages: 8, 14</p> <p>Sections: 2.3, AMC 27.1309 section "Single failure and common-cause considerations"</p> <p>Comment:</p> <p>AMC 27.1309 requires to consider development error as source of potential common cause.</p> <p>For class III, II and I with FDAL B to FDAL C requirement, it is not clear how Industry will be able to define the acceptable level of development error to be not mitigated since, by definition, those level of FDAL will allow to have some errors to remain in the design comparing to FDAL A. As a result, Thales understanding is that a FDAL A will be required for Class III to I to mitigate and meet common cause considerations, hence contradicting the required FDALs.</p> <p>Section "Single failure and common-cause considerations" in AMC 27.1309 must be updated in accordance with FAA safety continuum policy "Note 3: At rotorcraft function level, no single failure will result in a Catastrophic Failure Condition" which address failure similarly to AMC 25.1309 definition "Note: Errors may cause Failures, but are not considered to be Failures."</p>
response	Not accepted



Development assurance does not provide absolute guarantees against potential development errors; this is also true for DAL A. Architectural means are usually necessary to mitigate the effects of development errors. Proper application of the common cause analysis process is expected. An equivalent to note 3 from the FAA Safety Continuum is not necessary as it is covered by the requirement in CS 27/29.1309(b)(1). In addition, AMC 27/29.1309 clarifies the relationship between errors and failures:

‘Errors in development, manufacturing, installation, and maintenance can result in common-cause failures (including common-mode failures) and cascading failures’

comment

86

comment by: *Leonardo Helicopters*

(page 10, AMC 27.1309)

The requirement 27.1309 (c) declares:

“The operation of equipment and systems not covered by subparagraph (a) must not cause a hazard to the rotorcraft or its occupants throughout the operating and environmental limits for which the rotorcraft is certified.”

A definition of "Hazard" should be included in the AMC 27.1309 "Equipment, systems, and installations", considering that the definitions reported in the SAE ARP-4761 and SAE ARP-4754A are slightly different:

- SAE ARP-4761: A potentially unsafe condition resulting from failures, malfunctions, external events, errors, or a combination thereof.

- SAE ARP-4754A: A condition resulting from failures, external events, errors, or combinations thereof where safety is affected.

(same comment is applicable to the CS 29 section)

response

Not accepted

For definitions, please refer to the applicable standards. ARP4754A and ARP4761 will be updated soon and will resolve the difference in the definitions.

comment

87

comment by: *Leonardo Helicopters*

(page 11, AMC 27.1309 (b) Subpart B, C, and D)

Why it is not clearly indicated that the CS 27.1309 does not apply to the Rotor systems as indicated in the AMC 27.1309 (c) Subpart E (2) for the Rotor Drive systems ?

The same statement used for the Rotor Drive system should be introduced for the Rotor systems as well.

(same comment is applicable to the CS 29 section)

response

Not accepted

This is already covered by the exclusions mentioned for ‘(b) Subparts B, C, and D’ of the AMC as ‘Main and tail rotor structure’ are defined in CS 27.547 in Subpart C. For this aspect, this AMC 27.1309 for CS-27 and the way it should be interpreted is similar to AC 29.1309 (in FAA AC29-2C) for CS-29.



comment	<p>88 comment by: <i>Leonardo Helicopters</i></p> <p>(page 12, AMC 27.1309 (d) Subpart F (3): "Definition of classes of small rotorcraft")</p> <p>Considering the following statement: <i>"The classes described below are solely used for the purpose of establishing a graduated scale for the certification standards for systems and equipment"</i>.</p> <p>We suggest to clarify that if IFR certification is sought the minimum applicable Class is Class II, to avoid misunderstanding. For example, adding in table 1 the following statement: "a rotorcraft that is to be certified for IFR fill as minimum to Class II"</p>
response	<p>Accepted</p> <p>The following note was added for clarification:</p> <p>'A rotorcraft that is intended to operate under IFR, will need to be certified as a minimum as Class II.'</p>
comment	<p>89 comment by: <i>Leonardo Helicopters</i></p> <p>(page 13, AMC 27.1309 (d) Subpart F (3))</p> <p>Suggest to introduce an additional Note to Table 2, to highlight that, for Major qualitative/quantitative evaluation, the ARP4761 figure 4 can be used to define the type of analysis needed: introduce a note making reference to the ARP4761 figure 4 applicability for Major failure condition.</p>
response	<p>Not accepted</p> <p>This AMC only addresses the differences from the FAA AC 27-1B material contained in AC 27.1309 which in turn refers to the ARP4761 Table 2.</p>
comment	<p>90 comment by: <i>Leonardo Helicopters</i></p> <p>(page 13, AMC 27.1309 (d) Subpart F (3))</p> <p>Please review the following statement, included in Note 2 to Table 2: "It is recognised that, for various reasons, component failure rate data may not be precise enough to enable accurate estimates of the probabilities of failure conditions. This results in some degree of uncertainty. When calculating the estimated probabilities, this uncertainty should be accounted for in a way that does not compromise safety."</p> <p>An incorrect interpretation could be to require to estimate a probability of occurrence lower than the requirement (e.g. the Catastrophic safety requirement is $\leq 10^{-9}$, but considering the uncertainly estimated probability you have to meet $<0.9 \times 10^{-9}$).</p> <p>Below are reported similar statements from other guidilines:</p> <ul style="list-style-type: none"> - from PS-ASW-27-15: "Numerical values indicate an order of probability of failure range and are provided here as a reference." - from ASTM F3230 -17: "It is recognized that there is inherent variance in predictions used to demonstrate that these probabilities are met; it may therefore be acceptable, provided the analysis can be shown to be

conservative and is acceptable to the governing civil aviation authority, to be slightly above the probabilities shown in Table 5."

response **Noted**

The wording is similar to other AMC. The proposed changes from PS-ASW-27-15 and ASTM F3230 -17 are also acceptable for EASA, however these proposed changes are not considered to be clearer and do not reduce the risk of misinterpretation compared to the current wording.

comment **91** comment by: *Leonardo Helicopters*

(page 13, AMC 27.1309 (d) Subpart F (3))

Note 3 to Table 2, reported below, is written in a way than an Hazardous failure condition can not be met by a FDAL B combined with FDAL D. Please clarify.
 Note 3 on FDALs: "Using architectural considerations for assigning a FDAL as described in ED-79A/ARP4754A is possible for all classes, with the only exception that no FDAL D should contribute to hazardous or catastrophic failure conditions."

Please review Note 3, introducing the possibility to allocate FDAL B combined with an FDAL D for Hazardous failure condition for all classes.

response **Accepted**

DAL B/D for Hazardous FCs (Class IV) would be acceptable, as is the case today. Clarifying text on the applicability of Note 3 has been added in Table 2.

comment **97** comment by: *Transport Canada Civil aviation*

Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**
The NPA states: If a specific CS-27 requirement exists which predefines systems safety aspects (e.g. redundancy level or criticality) for a specific type of equipment, system, or installation, then the specific CS-27 requirement will take precedence. This precedence does not preclude accomplishment of a system safety assessment, if necessary. For example, CS27.695 is a provision that predefines a required level of redundancy and an implied system reliability. However, a system safety assessment approach may still be required to show that the implied system reliability is met and to address the assessment of the failure modes.	Consider adding content to the guidance material that the specific system safety requirements (e.g. reliability, redundancy) should be maintained and not reduced as part of the safety continuum.	Suggestion	Substantive



<p>Without actual required reliability levels being specified in other paragraphs (or associated guidance), it may prove difficult in the future to require the previously understood implied system reliability once a lesser system reliability has been stated for the same criticality level in 27.1309. Following implementation of this NPA, the applicant may reason that a given paragraph requires redundancy, but (based on 27.1309) the declared total system reliability for aircraft class II catastrophic criticalities is 10E-7, possibly resulting in lower component reliability than we have previously been familiar with.</p>			
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response

Not accepted

If other specific requirements define system specific reliability levels (e.g. a system failure needs to be ‘extremely improbable’), the new objectives from AMC 27.1309 apply equally, unless there are specific quantitative objectives, expressed as numerical probabilities.

comment

98

comment by: *Transport Canada Civil aviation*

Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**
<p>The EASA proposed AMC to 27.1309 which defines the class of aircraft (table 1) and the associated safety objectives (Table 2) are structured with Class IV at the top and decrease as it descends. The FAA Policy on Safety continuum and AC 23.1309-1E are structured with Class I at the top increasing as you descend in the table.</p>	<p>To increase harmoinization, TCCA suggests that the EASA table be organized in the same manner as the FAA table to facilitate cross referencing.</p>	<p>Suggestion</p>	<p>Substantive</p>

response

Accepted

In order to improve readability, the lines in Table 2 have been inverted. This will then be in the same order as the FAA policy statement.



comment

99

comment by: *Transport Canada Civil aviation*

Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**
<p>One of the objectives of the safety continuum was to define less stringent safety objectives than those currently defined in the FAA AC 27-1B in order to facilitate the introduction of new technology. TCCA supports this initiative. However, some existing technologies already meet the more stringent safety objectives and maybe significant contributors to the existing safety record.</p> <p>The NPA states: The EASA Rotorcraft Safety Roadmap identified the safety improvement of small CS-27 rotorcraft as a key priority. A safety review was conducted of the fatal and non-fatal rotorcraft accidents in Europe covering the period from 2009 to 2017 and the conclusion was that operational factors are the most prevalent cause of these accidents. This data is based on system reliability agreed under the present regulation, guidance and implied required reliability levels. This NPA is implementing lower specified reliability levels to enable introduction of additional systems and system capability to enhance safety operational factors, but these lowered reliability levels are being introduced in a manner that may also affect existing systems and system functionality. This may lead to an undesired reduction in safety for system events this data was based upon.</p> <p>Reducing the safety objectives of some failure condition classifications (e.g. major) may facilitate the introduction of new technologies, and leaving the safety objective of the more severe failure classifications (e.g. catastrophic) could help maintain the overall level of safety.</p>	<p>EASA could consider maintaining existing safety objectives for the most severe hazard classifications to protect the existing level of safety.</p>	<p>Suggestion</p>	<p>Substantive</p>

response

Not accepted

Loss of control in flight is one of the main reasons for accidents in CS-27 rotorcraft today. Introducing stabilisation systems that specifically address this risk, may have more severe repercussions than a major safety effect. Limiting the proportional approach to major failure conditions only, would not be considered to be sufficient to cover the intent of the proportionate approach.



comment	100	comment by: <i>Transport Canada Civil aviation</i>									
	<table border="1"> <thead> <tr> <th>Comment summary</th> <th>Suggested resolution</th> <th>Comment is an observation or is a suggestion*</th> <th>Comment is substantive or is an objection**</th> </tr> </thead> <tbody> <tr> <td> <p>Catastrophic failures shall never happen, regardless of AWM 27 or 29, and therefore the implied required probability for 27.1309 catastrophic we have strived for has been 10-E-9. Where available technology allowed, the expectation of domestic applicants has been (with few exceptions e.g. engines) to meet this probability. For example the reliability for loss of thrust directly caused by failures within single engines has not been expected to meet 10 E-9, whereas the fuel system for such engines can reasonably be expected to meet 10E-9 with readily available technology. Although full system safety analysis to substantiate 10E-9 may not always have been required for AWM 27 products, the expectation has been clear.</p> <p>For future programs, commercial pressures and formally adopted lower required levels of reliability will encourage use of lower quality components/configurations, ultimately leading to less robust systems in the future.</p> </td> <td> <p>EASA could consider maintaining existing safety objectives for the most severe hazard classifications to protect the existing level of safety.</p> </td> <td> <p>Suggestion</p> </td> <td> <p>Substantive</p> </td> </tr> </tbody> </table>	Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**	<p>Catastrophic failures shall never happen, regardless of AWM 27 or 29, and therefore the implied required probability for 27.1309 catastrophic we have strived for has been 10-E-9. Where available technology allowed, the expectation of domestic applicants has been (with few exceptions e.g. engines) to meet this probability. For example the reliability for loss of thrust directly caused by failures within single engines has not been expected to meet 10 E-9, whereas the fuel system for such engines can reasonably be expected to meet 10E-9 with readily available technology. Although full system safety analysis to substantiate 10E-9 may not always have been required for AWM 27 products, the expectation has been clear.</p> <p>For future programs, commercial pressures and formally adopted lower required levels of reliability will encourage use of lower quality components/configurations, ultimately leading to less robust systems in the future.</p>	<p>EASA could consider maintaining existing safety objectives for the most severe hazard classifications to protect the existing level of safety.</p>	<p>Suggestion</p>	<p>Substantive</p>	<p>response</p> <p>Not accepted</p> <p>It is expected that safety-enhancing technologies will be developed in a more affordable manner and thus become more prevalent in small rotorcraft, increasing the operational safety and therefore increasing the overall safety of the operation. It should be noted that the safety objectives are only changed in the lower CS-27 classes (i.e. Classes I-III)</p>	
Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**								
<p>Catastrophic failures shall never happen, regardless of AWM 27 or 29, and therefore the implied required probability for 27.1309 catastrophic we have strived for has been 10-E-9. Where available technology allowed, the expectation of domestic applicants has been (with few exceptions e.g. engines) to meet this probability. For example the reliability for loss of thrust directly caused by failures within single engines has not been expected to meet 10 E-9, whereas the fuel system for such engines can reasonably be expected to meet 10E-9 with readily available technology. Although full system safety analysis to substantiate 10E-9 may not always have been required for AWM 27 products, the expectation has been clear.</p> <p>For future programs, commercial pressures and formally adopted lower required levels of reliability will encourage use of lower quality components/configurations, ultimately leading to less robust systems in the future.</p>	<p>EASA could consider maintaining existing safety objectives for the most severe hazard classifications to protect the existing level of safety.</p>	<p>Suggestion</p>	<p>Substantive</p>								

comment	103	comment by: <i>Transport Canada Civil aviation</i>									
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<p>installed, in addition to specific systems requirements, except as indicated below.</p> <p>Furthermore, it also describes exceptions, for example:</p> <p>(d) Subpart F (1) CS 27.1309 does not apply to stowed safety equipment such as life rafts, life preservers, and emergency floatation equipment. It also does not apply to safety belts, rotorcraft seats, and handheld fire extinguishers. However, it does apply to hazards to the rotorcraft, its occupants, and flight crew introduced by the installation/presence of this type of equipment/systems (e.g. electromagnetic-interference considerations, fire hazards, and inadvertent deployment of emergency floatation equipment) approved as part of the type design.</p> <p>There is no clear intent as to when 27.1309 is to be applicable or not. For example, an emergency locator system must comply?</p>	<p>failure would lead to a hazard.</p>		
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response

Not accepted

The wording is not changed compared to FAA AC 29.1309(a)(1)(iv).

The applicability of CS 27.1309 is clearly stated in the requirement:

‘Equipment and systems [...] or whose improper functioning would lead to a hazard...’
 For the given example of the ELT, CS 27.1309 would be applicable, as the malfunctioning of the equipment could lead to a hazard (e.g. fire). For the functional aspects (correct functioning), the dedicated paragraphs in the CS/AMC would apply. But the malfunctioning of the equipment or any intrinsic hazard in the design, which could create a hazard at rotorcraft level, should be assessed in the frame of CS 27.1309.

comment

104

comment by: *Transport Canada Civil aviation*

Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**
<p>The NPA states the new wording for AMC 27.1309:</p> <p>Note 3 on FDALs: Using architectural considerations for assigning a FDAL as described in ED-79A/ARP4754A is</p>	<p>Allow for use of FDAL D, as per ARP4754A, considering that the contribution of systems with FDAL D to the overall failure will be considered in the combined probability.</p>	<p>Suggestion</p>	<p>Substantive</p>



<p>possible for all classes, with the only exception that no FDAL D should contribute to hazardous or catastrophic failure conditions.</p> <p>Why the deviation from ARP4754A? What is the rationale for not allowing FDAL D as a part of a system with hazardous failure conditions?</p>			
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response

Partially accepted

For classes I-III, the safety objectives have already been lowered to allow FDAL C to be assigned for hazardous failure conditions. Allowing the use of architectural considerations (as per ARP4754A) to further lower the DAL to permit the use of 2 DAL D members is not considered adequate or appropriate (also the case for catastrophic failure conditions for Classes I-II). Therefore, it is not permitted for Classes I to III. For Class IV, for hazardous failure conditions the combination of FDAL B/FDAL D would be possible. The wording of Note 3 to AMC 27.1309 has been changed to clarify this.

Appendix C - Criteria for Category A

p. 10

comment

28

comment by: GAMA

The notion of "no single failure" is introduced in addition to extremely improbable.

Applicability of the "no single failure" criteria should be clarified, notably because of the discrepancy between the new proposed rule CS 27.1309 (no single failure and extremely improbable) and the AMC 27.1309 in page 14 ("While single failures should normally be assumed to occur, experienced engineering judgement and relevant service history may show that a catastrophic failure condition caused by a single-failure mode is not a practical possibility. The logic and rationale used in the assessment should be straight forward and obvious that the failure mode simply would not occur unless it is associated with an unrelated failure condition that would, in itself, result in a catastrophic failure condition.")

Many systems are made of electrical items and mechanical items. Up to now, some mechanical items failures with catastrophic effects were demonstrated extremely improbable. There is no negative field experience about such items which will be discarded with the new rule.

The main objective of the NPA is the safety continuum. Introducing the "no single failure" criteria may create potential non compliance of existing designs if it is not limited to system aspects.



	<p>Suggested Resolution: The "No single failure" criteria should be limited to the systems or equipments and the mechanical items should be excluded. The exclusions provided in the AMC part should be included in the rule as it is done in CS 25. As an alternative, a "OR" between "extremely improbable" and "no single failure" could be proposed as follows : "each catastrophic failure condition is extremely improbable or does not result from a single failure;"</p>
response	<p>Not accepted</p> <p>It should be noted that the scope of CS 27.1309 is not extended to structural parts or elements; it only covers systems and equipment. The 'no single failure' criterion has already been included in the FAA AC 27/29.1309 material (this NPA does not change the intent, but transfers it to the level of the requirement), and an internal review of recently certified rotorcraft has shown that the 'no single failure' criterion has been systematically applied.</p>
comment	<p>29 comment by: GAMA</p> <p>The criteria related to continued safe flight and landing in CS-29 for Category A rotorcraft also applies to CS-27 Category A rotorcraft.</p> <p>Suggested Resolution: Add the additional text from 29.1309(b)(1) regarding continued safe flight and landing for Category A rotorcraft.</p>
response	<p>Partially accepted</p> <p>A reference to Appendix C and CS 29.1309(b)(1) has been reintroduced.</p>
comment	<p>30 comment by: GAMA</p> <p>The definition of the term "hazard" should be clarified. Is the definition in accordance with the ICAO definition as per doc 9859: "Hazard. A condition or an object with the potential to cause or contribute to an aircraft incident or accident."</p> <p>Suggested Resolution: Clarify the definition of "hazard"</p>
response	<p>Not accepted</p> <p>For definitions, please refer to the applicable standards (i.e. ARP4761/ARP4754A).</p>

comment

31

comment by: GAMA

About the wording : "The operation of equipment and systems not covered by subparagraph (a) must not cause a hazard to ..."

There is no AMC dedicated to 27.1309(c) detailing how the 'no hazard' substantiation is supposed to be performed.

AMC should clarify the interpretation of 1309-c vs 1309-a (notably about the following sentence of 1309a : "or whose improper functioning would lead to a hazard")

Suggested Resolution:

Add a part in the AMC 27.1309 explaining that the 'no hazard' substantiation is limited to the specific risks (fire, burst, EMI, ...) of the non-required equipment/system, i.e. no functional failure analysis (FHA/SSA) is expected.

response

Not accepted

The current FAA AC 27/29 has been found to provide sufficient guidance on this aspect, however the following will provide additional information on the EASA position, adapted from AMC 25.1309:

Equipment covered by CS 27/29.1309(a) should function properly when installed. This must be true for the operating and environmental conditions for which the rotorcraft is certified. External environmental conditions (e.g. atmospheric turbulence, HIRF, lightning, precipitation), which the rotorcraft is likely to encounter, should also be considered. The effects of the following should also be considered: vibration, acceleration loads, variations in fluid pressure and electrical power, fluid or vapour contamination. DO-160 may be used to support compliance. Equipment covered by an ETSO containing environmental test procedures can be used to support compliance.

For CS 27/29.1309(c), the equipment, systems, and installations covered by CS 27/29.1309(c) are typically those associated with amenities for passengers such as passenger entertainment systems, in-flight telephones, etc., whose failure or improper functioning in itself should not affect the safety of the rotorcraft. Operational and environmental qualification requirements for those equipment, systems, and installations are reduced to the tests that are necessary to show that their normal or abnormal functioning does not adversely affect the proper functioning of the equipment, systems, or installations covered by CS 27/29.1309(a) and does not otherwise adversely influence the safety of the rotorcraft or its occupants.

Examples of adverse influences are fire, explosion, exposing passengers to high voltages, etc. Normal installation practices should result in sufficiently obvious isolation so that substantiation can be based on a relatively simple qualitative installation evaluation. If the possible impacts, including failure modes or effects, are questionable, or isolation between systems is provided by complex means, more formal structured evaluation methods may be necessary.



comment	32	comment by: GAMA
	<p>NPA 2021-11 introduces a new sub paragraph (d) to 27.1309 compared to CS 27.1309 at amdt 8. Therefore, CS 27.1309 (d) should be introduced in the explanatory material.</p> <p>Suggested Resolution: Introduce CS 27.1309 (d) in the explanatory material.</p>	
response	<p>Not accepted</p> <p>The wording of the paragraph is the same as CS 29.1309(d), which is deemed to be equivalent to the current CS 29.1309(c). There is no guidance provided on this aspect in FAA AC 29-2C, therefore it is not considered necessary to provide guidance for CS 27.1309(d). Please refer to CS 27.1322 and CS 27.1302 and associated AMC for more guidance on these aspects.</p>	

comment	33	comment by: GAMA
	<p>About the wording "flight crew member responsible for taking corrective action" : Why not limit to flight crew? It is expected that each corrective action is determined and allocated to a specific flight crew member and the minimum crew determined in accordance with 1523/25 and 1302. What about Single Pilot configuration? The consequence would be to identify in all FHAs who is responsible for carrying out the corrective action. In addition, this requirement is not consistent with existing CS 29 or CS 25.</p> <p>Suggested Resolution: Remove "member responsible for taking corrective action" from the first sentence and "member" from the second sentence of the paragraph CS27.1309(d) in order to get the following sentences : "Information concerning an unsafe system operating condition must be provided in a timely manner to the flight crew. The information must be clear enough to avoid likely flight crew errors."</p>	
response	<p>Not accepted</p> <p>The same wording is used in other AMC material and the meaning is considered to be equivalent. In this context, it is considered that there is no difference between the term 'flight crew' and 'flight crew member'.</p>	

3.2.1. Draft Certification Specifications

p. 15

comment	44	comment by: GAMA
	<p>About the wording : "Equipment and systems required to comply with type-certification requirements, airspace requirements or operating rules, ..." :</p>	



response	<p>The definition of 'required / not required' equipment/system and the definition of equipment should be clarified.</p> <p>Suggested Resolution: A Guidance Material GM 279-1309(a) should propose examples of 'required / not required' equipment/system and the definition of equipment.</p> <p>Not accepted</p> <p>See response to comment #18.</p>
comment	<p>45 comment by: GAMA</p> <p>wording "limits" is not adequate regarding operations, indeed, limits are not certified whereas an envelope is so where the helicopter can be flown safely</p> <p>Suggested Resolution: Replace "limits" by "operating and environmental envelope". As an alternative, replace "limits" by "operating and environmental limitations" in order to be consistent with the subpart G</p>
response	<p>Not accepted</p> <p>See response to comment #21.</p>
comment	<p>46 comment by: GAMA</p> <p>About the wording "...required to comply with type-certification requirements, airspace requirements or operating rules..." :</p> <p>The idiom "airspace requirements" is ambiguous. Such requirements may address equally ground segment and airborne systems.</p> <p>It is assumed that "airspace requirements" address the Surveillance Performance and Interoperability (SPI IR) and associated Easy Access Rules CS-ACNS. The 29.1309(a) proposal is beyond Basic Regulation Essential requirements for airworthiness ANNEX II 1.3.2.</p> <p>They are many regulations about airspace requirements including interoperability regulations.</p> <p>Suggested Resolution: The regulations about airspace requirements that EASA refers to should be clarified</p>
response	<p>Not accepted</p> <p>See response to comment #19.</p>



comment	47	comment by: GAMA
	<p>There seems to be a logic flaw in the sentence about systems whose improper functioning would lead to a hazard.</p> <p>Indeed, CS 29.1309(a) excludes systems whose improper functioning would lead to a hazard.</p> <p>CS 29.1309(c) addresses systems not covered by (a), ie. it covers systems whose improper functioning do not lead to a hazard.</p> <p>CS 29.1309(c) requires that those systems, whose improper functioning not leading to a hazard, must not cause a hazard. This a faulty logic condition, since a system cannot cause a hazard if its improper functioning does not lead to a hazard.</p> <p>For systems that are not required, either by CS or operating/airspace rules, the demonstration of proper functioning as intended for the system function will be performed iaw CS xx.1301 (d)</p> <p>Suggested Resolution: It is proposed to remove the following wording : ", or whose improper functioning would lead to a hazard,"</p>	
response	<p>Not accepted</p> <p>See response to comment #20.</p>	
comment	48	comment by: GAMA
	<p>About operations rules, Operating requirements do vary depending on the state of the operators. EASA should clarify which referential is used for the purpose of type certification when based on this new CS x.1309. Indeed the TCH must be in a position to verify compliance at the time of declaration of compliance.</p> <p>Suggested Resolution: Add an AMC content to indicate which operating and airspace requirements have to be applied with a reference to the intended (EU) regulation where the requirements have to be retrived (e.g. AIR-OPS 965/2012;(EU) No 1207/2011;(EU) No 1206/2011). The link to CS-ACNS could possibly be made here to help the manufacturer to identify the required equipment.</p>	
response	<p>Not accepted</p> <p>The type of operation and the applicable operational rules depend on where the rotorcraft is intended to be operated, this is not limited to EU rules alone. In addition, the content and reference to the applicable EU regulations is evolving and subject to change. It is not deemed beneficial to add references to the current applicable European operational and airspace regulations.</p>	
comment	49	comment by: GAMA

The statement "...or whose improper functioning would lead to a hazard..." implies that non-essential equipment which is not required by CS-29, airspace requirements or operating rules must also perform their intended function. Non-essential equipment is already covered under 29.1309(c) and clarification is provided in AC 29-2C regarding applicability of non-essential equipment.

Optional equipment like entertainment systems, cameras, searchlights, operator consoles should function properly, but proper functioning of this type of equipment is not required and is a matter of customer satisfaction.

Note that it is recognized that the equipment must not create a hazard as required by 29.1309(c).

Suggested Resolution:

Clarify that paragraph (a) only applies to equipment required by CS-29, airspace requirements or operating rules. It is proposed that 29.1309(a) be worded as follows:

"Equipment and systems required to comply with type-certification requirements, airspace requirements or operating rules, must be designed and installed so that they perform their intended function throughout the operating and environmental limits for which the rotorcraft is certified."

response Not accepted

See response to comment #27.

comment

50

comment by: GAMA

About the wording : "in relation to other systems"

The text should clarify that the requirement applies to installed equipment or installation in accordance with the former 29.1309 definition.

Therefore, it is proposed to reduce the applicability of "other systems" to "other installed systems". Indeed, Non-installed equipment are addressed differently in the Basic Regulation.

Suggested Resolution:

Add the term "installed" as follows :

"The equipment and systems covered by subparagraph (a), considered separately and in relation to other installed systems, must be designed and installed such that:"

response Not accepted

In the applicability section, it is clarified that:

'CS 27.1309 is intended to be a general requirement that is applicable to any equipment or system as installed,...'

comment

51

comment by: GAMA



	<p>About the wording "and in relation to others systems" : Does it mean the combination of failures among/between systems are as well driving safety qualitative and quantitative objectives to be met ? The extent of "and in relation to others systems" should be clarified</p> <p>Suggested Resolution: AMC should be clarified for an assessment at aircraft level and not only at system level as per ARP 4754A. AMC should clarify that the cumulative effects are not covered by this requirement (eg., cumulation of many effects on different systems from a single failure, possibly leading to a CAT event)</p>
response	<p>Not accepted</p> <p>See response to comments #24 and #25.</p>
comment	<p>52 comment by: GAMA</p> <p>"and in relation to others systems", does it mean the combination of failures among systems are as well driving safety qualitative and quantitative objectives to be met to be approved? the extent of "and in relation to others systems" should be clarified</p> <p>Suggested Resolution: AMC should be clarified for an assessment at aircraft level and not only at system level as per ARP 4754A. AMC should clarify that the cumulative effects are not covered by this requirement (eg., cumulation of many effects on different systems from a single failure possibly leading to a CAT event)</p>
response	<p>Not accepted</p> <p>See response to comment #25.</p>
comment	<p>53 comment by: GAMA</p> <p>The notion of "no single failure" is introduced in addition to extremely improbable.</p> <p>Applicability of the "no single failure" criteria should be clarified, notably because of the discrepancy between the new proposed rule CS 29.1309 (no single failure and extremely improbable) and the AMC 29.1309 in page 14 ("While single failures should normally be assumed to occur, experienced engineering judgement and relevant service history may show that a catastrophic failure condition caused by a single-failure mode is not a practical possibility. The logic and rationale used in the assessment should be straightforward and obvious that the failure mode simply would not occur unless it is associated with an unrelated failure condition that would, in itself, result in a catastrophic failure condition.")</p>



Many systems are made of electrical items and mechanical items. Up to now, some mechanical items failures with catastrophic effects were demonstrated extremely improbable. There is no negative field experience about such items which will be discarded with the new rule.

The main objective of the NPA is the safety continuum. Introducing the "no single failure" criteria may create potential non compliance of existing designs if it is not limited to system aspects.

Suggested Resolution:

The "No single failure" criteria should be limited to the systems or equipments and the mechanical items should be excluded.

The exclusions provided in the AMC part should be included in the rule as it is done in CS 25.

As an alternative, a "OR" between "extremely improbable" and "no single failure" could be proposed as follows :

"each catastrophic failure condition is extremely improbable or does not result from a single failure;"

response Not accepted

See response to comment #28.

comment

54

comment by: GAMA

Paragraph (b) associates consequence with implied probabilities (e.g. catastrophic with extremely improbable and major with remote).

Suggested Resolution:

Alignment between failure effects and reliability targets are identified in AC 29-2C.

Paragraph (b) could be written to associate the hazards to safety objectives as follows:

"The equipment and systems covered by subparagraph (a), considered separately and in relation to other systems, must be designed and installed to meet the expected safety objectives such that:"

response Not accepted

The wording used is the same as for many other certification specifications. EASA does not see any added value in changing the wording to the suggested resolution as presented in the comment.

comment

55

comment by: GAMA

About the wording : "The operation of equipment and systems not covered by subparagraph (a) must not cause a hazard to ..."



response	<p>There is no AMC dedicated to 29.1309(c) detailing how the 'no hazard' substantiation is supposed to be carried out.</p> <p>AMC should clarify the interpretation of 1309-c vs 1309-a (notably about the following sentence of 1309a : "or whose improper functioning would lead to a hazard")</p> <p>Suggested Resolution: Add a part in the AMC 29.1309 explaining that the 'no hazard' substantiation is limited to the specific risks (fire, burst, EMI, ...) of the non-required equipment/system, i.e. no functional failure analysis (FHA/SSA) is expected.</p> <p>Not accepted</p> <p>See response to comment #31.</p>
comment	<p>56 comment by: GAMA</p> <p>The definition of the term "hazard" should be clarified. Is the definition in accordance with the ICAO definition as per doc 9859: "Hazard. A condition or an object with the potential to cause or contribute to an aircraft incident or accident."</p> <p>Suggested Resolution: Clarify the definition of "hazard"</p>
response	<p>Not accepted</p> <p>See response to comment #30.</p>
comment	<p>57 comment by: GAMA</p> <p>About the wording "flight crew member responsible for taking corrective action" : Why not limit to flight crew? It is expected that each corrective action is determined and allocated to a specific flight crew member and the minimum crew determined in accordance with 1523/25 and 1302. What about Single Pilot configuration? The consequence would be to identify in all FHAs who is responsible for carrying out the corrective action.</p> <p>In addition, this requirement is not consistent with existing CS 29 or CS 25.</p> <p>Suggested Resolution: Remove "member responsible for taking corrective action" from the first sentence and "member" from the second sentence of the paragraph CS29.1309(d) in order to get the following sentences : "Information concerning an unsafe system operating condition must be provided in a timely manner to the flight crew. The information must be clear enough to avoid likely flight crew errors."</p>
response	<p>Not accepted</p> <p>See response to comment #33.</p>



comment	58	comment by: GAMA
	CS29.1310 and AMCS 29.1310 should be consistent and the content of CS29.1310 should be aligned with proposed CS29.1309(a)	
	Suggested Resolution: It is proposed to change : "For Category A rotorcraft, each installation whose functioning is required by this CS-29 and which requires a power supply is an 'essential load' on the power supply [...]" by : "Each installation whose functioning is required for type certification or by operating rules and that requires a power supply is an "essential load" on the power supply [...]"	
response	Partially agreed	
	It is agreed that CS 29.1310 and AMC 29.1310 should be consistent and the content of CS 29.1310 should be aligned with the amended CS 29.1309(a). The wording has been changed to meet this intent.	
comment	59	comment by: GAMA
	About the wording : "[...] each installation whose functioning is required by this CS-29 and which requires a power supply is an 'essential load' on the power supply." The definition of essential loads should be clarified in the AMC 29.1310 and and a Guidance Material GM 29.1310 should propose examples of essential loads	
	Suggested Resolution: Clarify the definition of "essential loads" in the AMC 29.1310 and add a GM 29.1310 giving examples of essential loads	
response	Partially accepted	
	The wording is self-explanatory; nevertheless it is noted that the wording could be improved therefore the text has been changed to: 'For Category A rotorcraft, each installation whose functioning is required to comply with type-certification requirements, airspace requirements or operating rules and which requires a power supply is an 'essential load' on the power supply.'	
comment	60	comment by: GAMA
	About the wording : "[...] each installation whose functioning is required by this CS-29 and which requires a power supply is an 'essential load' on the power supply." The definition of essential loads should be clarified in the AMC 29.1310 and and a Guidance Material GM 29.1310 should propose examples of essential loads	
	Suggested Resolution:	

	Clarify the definition of "essential loads" in the AMC 29.1310 and add a GM 29.1310 giving examples of essential loads	
response	Not accepted See response to comment #59.	
comment	61 The new paragraph CS 29.1310 is mainly focused on electrical systems and equipment. Rather than being part of the "General" section of the subpart F "Equipment" of CS 29, it is proposed to move CS 29.1310 between or within CS 29.1351 and/or 29.1353 Suggested Resolution: Move CS 29.1310 between CS 29.1351 and 29.1353, or within CS 29.1351, or within 29.1353	comment by: GAMA
response	Not accepted To maintain alignment with the certification specifications for large aeroplanes where CS 25.1310 has been introduced, it has been decided to create a new paragraph right after CS 29.1309.	
comment	62 About the wording : "the AMC to CS-29 consists of FAA AC 29-1B Change 7, dated 4 February 2016." Even if AC 29-1B change 8 does not address 29.1309, by principle, the AMC should refer the latest AC change. Futhermore, in CS 29 Amdt 9 Book 2, AMC MG 21 about Guidance on creating a system level Functional Hazard Assessment (FHA) says : "The guidance contained within FAA AC 29-2C Change 7 MG 21 has been deemed by EASA to be at variance with EASA's interpretation or its regulatory system and therefore should not be considered to be EASA acceptable means of compliance." Why does the new AMC 29.1309 introduce the AC 29-1B change 07 ? Suggested Resolution: Refer the latest FAA AC 29-1B Change or remove any reference to the FAA AC 29-1B	comment by: GAMA
response	Not accepted See response to comment #34.	
comment	83	comment by: FAA



Paragraph Number	Referenced Text	Comment/Rationale or Question	Proposed Resolution
3.2.1	(b)(1)	The additional wording "and does not result from a single failure," is listed in the proposed regulation.	Remove the wording "and does not result from a single failure".
response	<p>Not accepted</p> <p>See response to comment #82.</p>		

3.2.2. Draft acceptable means of compliance

p. 17

comment	1	comment by: <i>FNAM</i>
	Favorable Opinion : The safety evaluation of the equipments ensures a better safety of winching equipment. Yet, this evaluation will imply delays	
response	<p>Not accepted</p> <p>This comment is not relevant to this NPA.</p>	
comment	63	comment by: <i>GAMA</i>
	<p>About the wording : "In determining compliance with subparagraphs (2) and (3) of CS 29.1310,"</p> <p>There is copy-paste typo from the former CS 29.1309 paragraph (f) at amdt 9 which said : "(f) In determining compliance with subparagraphs (e)(2) and (3), the power loads may be assumed to be reduced under a monitoring procedure consistent with safety in the kinds of operations authorised."</p> <p>It is proposed to change "In determining compliance with subparagraphs (2) and (3) of CS 29.1310,"</p> <p>by "In determining compliance with subparagraphs (a) and (b) of CS 29.1310,"</p> <p>Suggested Resolution: Replace "subparagraphs (2) and (3)" by "subparagraphs (a) and (b)"</p>	
response	<p>Accepted</p> <p>Text changed to: 'sub-paragraphs (a) and (b) of CS 29.1310'</p>	
comment	64	comment by: <i>GAMA</i>



The first sentence under Single failure and common-cause considerations is incorrect. To be clear 29.1309(b)(1) only states "...does not result from a single failure". It does not identify component, part, or element of a system.

The third sentence under Single failure and common-cause considerations is also incorrect as it refers to "the single component, part, or element" that are not defined.

Suggested Resolution:

Revise the AMC to accurately state what is included in 29.1309(b)(1) as follows:

"According to CS 29.1309(b)(1), a catastrophic failure condition must not result from a single failure."

Delete the third sentence and clearly define which single failures need to be considered in the fourth sentence (note structural failures are not to be considered).

response

Partially accepted.

The intent of the paragraph is to clarify what needs to be considered in the 'no single-failure' concept. The first sentence has been updated to clarify the link between single failures and a failure of a single component, part or element of a system. This also clarifies that structural parts are excluded. The AMC to the CS for large aeroplanes, AMC 25.1309 contains a similar wording.

comment

65

comment by: GAMA

With 29.1310 being moved from 29.1309, the connection to the safety assessment has been lost.

Suggested Resolution:

Clarify in the AMC that ARP4761/4754 can be used (are applicable) to show compliance to the new CS 29.1310.

response

Not accepted

The introduction of CS 29.1310 'Power source capacity and distribution' is an administrative change only as it only a copy of the previous requirements that were contained in CS 29.1309. It was not foreseen to change the AMC.

comment

84

comment by: FAA

Paragraph Number	Referenced Text	Comment/Rationale or Question	Proposed Resolution
3.2.2	Single failure and common-cause consideration	This section describes an acceptable safety assessment and does not appear to add any new considerations. The FAA does not think it is necessary and may cause confusion to applicants.	Remove this section.



response Not accepted

As the 'no single-failure' criterion was raised to the level of a requirement, it is deemed necessary to provide AMC material. The intent is to clarify the expected type and scope of analysis to comply with the requirement.

AMC 29.1309 Equipment, systems, and installations

p. 17

comment 75

comment by: UK CAA

Page No: 10 and 17

Paragraph No: CS 27.1309(a) and CS 29.1309(a)

Comment:

Although the majority of changes specified in this NPA are there to bring CS-27 in line with the changes that have already been made to the other CS documents, it would be beneficial to note that some of the changes could be subject to misinterpretation or an overly narrow interpretation. This could result in a potential degradation of safety. An example of this is the change of wording to 1309(a). The previous text required equipment, systems and installations to perform their intended functions "under any foreseeable operating condition". The new text requires that they perform their intended functions "throughout the operating and environmental limits for which the rotorcraft is certified".

Justification:

It is possible that some entirely foreseeable types of failure condition, human error or simple bad luck (e.g., the need for rapid manoeuvres to avoid mid-air collision) could drive the rotorcraft outside the operating and environmental limits to which it was certificated.

Proposed Text:

Additional guidance regarding the interpretation of such statements should be considered.

response Not accepted

The text 'under any foreseeable operating condition' has been clarified and replaced by 'throughout the operating and environmental limits for which the rotorcraft is certified'. This updated text has been also introduced in the AMC to CS 25.1309 and the wording



is now aligned for rotorcraft through the changes that were proposed in this NPA. The meaning of 'any foreseeable operating condition' and 'operating and environmental limits for which the rotorcraft is certified' are considered to be equivalent.

comment 92 comment by: *Leonardo Helicopters*

(page 17, Paragraph "single failure and common-cause considerations" on AMC 27.1309)

Considering the following statement:
"Protection from multiple failures should be provided when the first malfunction or failure would not be detected during normal operations of the aircraft, which includes pre-flight checks."

Please clarify the intent of the statement, and eventually its impact on the safety and/or maintenance analysis.

response Noted

The intent of this paragraph is to ensure that the exposure time of a significant latent failure is reduced, if it cannot be eliminated by design. The paragraph has been reworded for clarification purposes in AMC 29.1309, and it has been removed in AMC 27.1309.

4.1.2. Harmonisation with the FAA

p. 19

comment 105 comment by: *Transport Canada Civil aviation*

Comment summary	Suggested resolution	Comment is an observation or is a suggestion*	Comment is substantive or is an objection**
<p>The NPA states: By introducing this policy statement, an SSD was created, which leads to an increase in the validation effort required to certify rotorcraft between certification partners, and potentially the need for subsequent changes to the type design prior to EASA certification.</p> <p>By defining subclasses that are different than what is proposed by the FAA, EASA will increase the validation efforts required to certify rotorcraft between certification partners.</p> <p>Further, in section 4.1.5, the NPA states:</p> <p>However, the safety objectives that are proposed for FAA Subclass 1 helicopters would not be aligned with the safety objectives that have been developed for</p>	<p>Create a sub-class specifically to address the lower end (and aligned with the eVTOL SC) and allow for some alignment between the classes proposed by the FAA.</p>	<p>Suggestion</p>	<p>Objection</p>



<p>VTOL Class I. It is considered that although there could be an overall improvement in operational safety, there might be a lower integrity of the systems and equipment that would be installed.</p> <p>Can an alternative set of classes be considered? One that maximizes the communality between the European-centric approach and what the FAA has proposed?</p>			
<p>response</p>	<p>Not accepted</p> <p>The definition of classes has been made on the basis of the FAA Policy Statement PS-ASW-27-15 in order to maximise the alignment with the FAA. In addition, the safety objectives have been defined in order to align the small rotorcraft Class IV with CS-29 and the SC eVTOL enhanced category. EASA believes that CS-27 Class 1 rotorcraft are closer to CS-23 Class 1 aircraft in terms of complexity and risk than to a VTOL basic Class 1. In addition, the safety objectives for CS-27 Class 1 have been chosen in order to offer an entry level for these types of products and be eligible to use Part 21 Light.</p>		

4.1.3. Safety risk assessment p. 20

comment

<p>101</p>	<p>comment by: <i>Transport Canada Civil aviation</i></p>		
<p>Comment summary</p>	<p>Suggested resolution</p>	<p>Comment is an observation or is a suggestion*</p>	<p>Comment is substantive or is an objection**</p>
<p>The NPA states:There is an opportunity through increasing proportionality that safety equipment for the lower end of the CS-27 spectrum could be more easily and affordably introduced, which could increase the overall operational safety of this class of rotorcraft mainly due to the increased economic viability of these safety improvements.</p> <p>Would it be better to focus changes on specific equipment, the introduction of which is believed beneficial for the lower end of CS27, rather than applying lower reliability requirements to CS27 in general? I note that the NPA does identify some system/system functionality as not being subject to the lowered reliability levels, would it be clearer</p>	<p>EASA could consider reducing safety objectives for lower classifications only (e.g. systems with lower criticality) to facilitate the incorporation of safety equipment.</p>	<p>Suggestion</p>	<p>Substantive</p>

and safer to instead retain higher general required reliability levels, and provide the lower exceptions to the specific equipment that needs this benefit in order to be introduced?			
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response Not accepted

It should be noted that the safety objectives are only changed in the lower CS-27 classes (i.e. Classes I-III). Class IV retains the same safety objectives as there are today for CS 27.1309. Limiting the proportional approach to only specific systems with low criticality, would not be considered sufficient to cover the intention of the proportionate approach.

4.5.4. Economic impact

p. 24

comment 2

comment by: *FNAM*

It seems unrealistic that the cost of new winches is equivalent to those already existing given the new requirements that will require new winch design and additional test and documentation (estimated 1M€ per manufacturer).

More and more operations are using winches in the world, but would this be sufficient to enlarge the market enough to have a significant price decrease? Moreover, manufacturing and development costs are more important for existing manufacturer than for new ones.

The TBO every 10 years is a real plus, however everything will depend on the price of works because if TBD is extended, the price may increase. Moreover, not all operators may afford buying new winche knowing the existing one is functioning properly.

response Not accepted

This comment is not relevant to this NPA.

comment 78

comment by: *Thales Avionics SAS*

Page: 25

Section: 4.5.4

Comment:

Discrepancy between rotorcraft classes of small rotorcraft between AMC 27.1309 and FAA PS-ASW-27-15 will impact significantly the validation effort between EASA and FAA for rotorcraft models not classified with the same class according to EASA and FAA




	<p>policies as highlighted in 4.5.4 for option 2. Arguments given in §4.5.4 for option 2 for European approach compensating validation activities are not understood and rational should be more detailed regarding validation process activities. EASA should clarify and detail the validation process with FAA.</p>
<p>response</p>	<p>Noted</p> <p>The impact on validations with the FAA has not been considered in the rulemaking process. The intent is to reduce the validation effort for applicants. The current situation leads to significant differences as AMC 27.1309 and the FAA PS-ASW-27-15 prescribe different objectives. There can be up to 3 orders of magnitude (10^{-6} vs 10^{-9}) difference. The remaining differences are now limited after the changes that have been proposed in this NPA. The list of SEI will be reconsidered after the update of CS 27.1309 and associated AMC.</p>

<p>5. Proposed actions to support implementation</p>	<p>p. 29</p>
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<p>comment</p>	<p>7 comment by: IFA</p> <p>IFA supports the proposal for a future information session. This should not only offer a presentation of the changes to the rules but a tutorial element to ensure that there are not only common expressions but common interpretations of the rules.</p>
<p>response</p>	<p>Noted</p> <p>EASA hopes to arrange some information sessions in the future.</p>



3. Attachments

 [12575.pdf](#)

Attachment #1 to comment [#8](#)



