



European Union Aviation Safety Agency

Comment-Response Document (CRD) 2022-01

RELATED: NPA: 2022-01 & ED DECISION 2023/001/R — RMT.0128
27.1.2023

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1. Summary of the outcome of the consultation

358 comments were received from 15 stakeholders. Table 1 below shows the number of comments received by each commenter.

COMMENTERS	# OF COMMENTS
AIRBUS HELICOPTERS	102
AOPA Sweden	2
ASD	1
Bell	17
DGAC FR (Mireille Chabroux)	1
European Helicopter Association	6
FAA	1
Garmin International	3
GE Aviation	4
General Aviation Manufacturers Association	179
German Federal Ministry for Digital and Transport	1
LBA	1
Leonardo Helicopters	10
Stefan Stroeker	1
Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)	1
TCCA, National Aircraft Certification	28
<i>Total 358</i>	

Table 1

Table 2 below shows the number of comments received per segment.

NPA 2022-01 SEGMENTS	# OF COMMENTS
(General Comments)	15
1. About this NPA	1
2.3. How we want to achieve it - overview of the proposals	1
CS 27.1458 Lightweight flight recorder	10
AMC1 27.1458 Lightweight flight recorder	13
AMC1 27.959 Unusable fuel supply	4
AMC1 29.959 Unusable fuel supply	4
AMC1 29.901(d)(1) Installation	6
AMC1 27.1337(b) Powerplant instruments	1
AMC1 29.1337(b) Powerplant instruments	1
AMC1 27.571 Fatigue evaluation of flight structure	13
AMC1 29.571 Fatigue tolerance evaluation of metallic structure	12
CS 27.602 Critical parts	5



1. Summary of the outcome of the consultation

AMC1 27.602 Critical parts	12
CS 29.602 Critical parts	4
AMC1 29.602 Critical parts	11
AMC1 27.923 Rotor drive system and control mechanism tests	4
AMC1 29.923 Rotor drive system and control mechanism tests	2
CS 27.1305 Powerplant instruments	4
CS 29.1305 Power plant Powerplant instruments	3
AMC1 27.1521 Powerplant limitations	4
AMC1 29.1521 Powerplant limitations	4
AMC1 27.927 Additional tests	1
AMC1 29.927 Additional tests	1
AMC1 27.1529 Instructions for continued airworthiness	11
AMC1 29.1529 Instructions for continued airworthiness	9
CS 27.1555 Control markings	5
CS 29.1555 Control marking	5
CS 27.1549 Powerplant instruments	3
CS 29.1549 Powerplant instruments	3
AMC1 27.965 Fuel tank tests	1
AMC1 29.965 Fuel tank tests	1
CS 29.1145 Ignition switches	3
CS 27.1305 Powerplant instruments	1
AMC1 29.1145(a) Ignition switches	4
CS 29.1305 Powerplant power plant instruments	1
AMC1 27.903(d) Engines	6
CS 29.1305 Powerplant power plant instruments	2
AMC1 29.903(e) Engines	10
AMC1 27.1301 Function and installation	5
AMC1 29.1301 Function and installation	6
AMC1 27.251 Vibration	5
AMC2 29.917 Drive Rotor drive system design	2
AMC1 29.251 Vibration	5
CS 29.811 Emergency exit marking	1
AMC1 27.307 Proof of structure	4
AMC2 27.307 Proof of structure	4
AMC1 29.307 Proof of structure	4
AMC2 29.307 Proof of structure	4
AMC1 27.607 Fasteners	12
AMC1 29.607 Fasteners	12
AMC1 27.610 Lightning and static electricity protection	3



AMC1 29.610 Lightning and static electricity protection	3
CS 27.309 Design limitations	2
AMC1 27.337 Limit manoeuvring load factor	4
CS 29.309 Design limitations	2
AMC1 29.337 Limit manoeuvring load factor	4
AMC1 27.613 Material strength properties and design values	8
AMC1 29.613 Material strength properties and design values	7
AMC1 27.1093(b)(1)(i) Induction system icing protection	5
AMC1 29.1093(b)(1)(i) Induction system icing protection	6
AMC3 27.307 Proof of structure	4
AMC3 29.307 Proof of structure	4
AMC1 27.561 General	6
AMC1 29.561 General	5
AMC1 27.1309 Equipment, systems, and installations	7
AMC1 29.1309 Equipment, systems, and installations	13
AMC 1 29.1319 Equipment, systems and network information security protection	3
AMC1 27.1305(l)(2) Powerplant instruments	2
AMC1 29.1305(a)(4) Powerplant instruments	2
CS 29.801 Ditching	2
8.2. The text is clear, readable and understandable	1

Total 358

Table 2

90% of the comments came from the industry and the other comments came from NCAs. Most of the topics presented in the document were equally commented even if some topics received more comments:

- CS/AMC 27.1458 ‘Lightweight flight recorder’ with 23 comments;
- AMC1 27/29.571 ‘Fatigue evaluation of flight structure’ with 25 comments;
- AMC1 27/29.602 ‘Critical parts’ with 27 comments;
- AMC1 27.1529 ‘Instructions for continued airworthiness’ with 20 comments;
- AMC1 27.607 ‘Fasteners’ with 24 comments.

One third of the comments submitted were accepted or partially accepted, around 40 % were noted and around a quarter of them were not accepted as shown in Table 4 below.

	ACCEPTED	PARTIALLY ACCEPTED	NOTED	NOT ACCEPTED	Total
# of occurrences	46	70	161	86	358
percentage	13%	19%	44%	24%	100%

Table 4

The individual comments and the responses to them are contained in Chapter 2 of this comment-response document (CRD).

Please refer to Section 2.4 of the Explanatory Note to ED Decision 2023/001/R for a summary of the main comments received and of the most significant changes made compared with the text proposed in NPA 2022-01.



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.



2.1. CRD table of comments and responses

(General Comments)

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comment	1	comment by: <i>AOPA Sweden</i>
	<p>AOPA Sweden Comments on NPA 2022-01</p> <p>In general we do not have any comments other on item 8.</p>	
response	<p>Noted</p> <p>Thank you for your support.</p>	
comment	3	comment by: <i>German Federal Ministry for Digital and Transport</i>
	<p>General comment:</p> <p>It is necessary to accept a strong role of the certified CIS as being responsible for the dynamic reconfiguration of U-Sapce airspaces - regardless of the presence of a controlled or uncontrolled airspace. It is intended to require CIS being a certified ATC in Germany putting them in a position to carry out the task of dynamic reconfiguration of the U-Space airspace, even if they are not the ATC in charge. A data link between the ATC and the CIS is necessary to allow the regular exchange of the air situation picture between the two. To assign the task of dynamic recomnfiguraten to the CIS instead of the ATC in charge allows for a single process in both,controlled and uncontrolled airspace.</p>	
response	<p>Not accepted.</p> <p>Not relevant for the Regular Update of CS-27 and CS-29.</p> <p>Please note that this comment will not be forwarded.</p>	
comment	5	comment by: <i>LBA</i>
	<p>LBA has no comments</p>	
response	<p>Noted</p> <p>Thank you for your support.</p>	
comment	6	comment by: <i>DGAC FR (Mireille Chabroux)</i>
	<p>DGAC France would like to thank EASA for this consultation, and inform EASA that we have no position or comment on the proposed document</p>	
response	<p>Noted</p>	



Thank you for your support.

comment

7

comment by: *Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)*

Thank you for the opportunity to comment on NPA 2022-01. Please be advised that there are no comments from the Swedish Transport Agency.

response

Noted
Thank you for your support.

comment

115

comment by: *FAA*

Paragraph Number	Comment/Rationale or Question	Proposed Resolution
27.1458 and 27/29.1319 Security Systems	These are new regulations that will create a difference between the EASA standards and the FAA standards.	These proposed changes will very likely become SSDs and SEIs, unfortunately increasing the validation burden in both directions.
AMC 1337b	This guidance would add requirements for discerning water contaminated fuel that seems to be information we don't have in our guidance creating a difference between the EASA method of compliance (MOC) and the FAA MOC..	These proposed changes will very likely be identified as SEIs unfortunately increasing the validation burden in both directions.
AMC 1305	This guidance for independent fuel quantity and fuel low level systems is proposed to be modified with language for combining the system with the appropriate design assurance level which is different than we currently require creating a difference between the EASA method of compliance (MOC) and the FAA MOC.	These proposed changes will very likely be identified as SEIs unfortunately increasing the validation burden in both directions.
2x.602 rule changes	The proposed change adds field tracking to parts that might be considered "critical parts." This is not an appropriate use of the 2x.602 rules that intend to impose frozen planning under part 21 quality control requirements.	The FAA suggests withdrawing this proposed rule pending further international coordination.
All Rule and AMC Changes	The majority of the changes would introduce new differences between FAA and EASA.	Each of these items will very likely become SSDs and SEIs, unfortunately increasing the



response

validation burden in both directions.

- **On point 1: 27.1458 and 27/29.1319 Security Systems:**

Noted.

The FAA was informed of the subject regular update of CS-27/CS-29 and was invited to comment accordingly.

Concerning CS 27.1458, the requirement for the lightweight flight recorder was included to ease showing of compliance with EU operating rules.

Concerning AMC1 29.1319, the proposed amendment is only to clarify how 'adverse effects' should be understood. The rule was first introduced with Amendment 8 of CS-29.

- **On point 2: AMC 1337b:**

Accepted.

This topic has been removed from the EDD. Strategy on the water susceptibility will be internally reviewed; modified and clarified wording may be part of future regulation updates.

- **On point 3: AMC 1305:**

Not accepted.

The proposed amendment helps dealing with recent designs.

- **On point 4: 2x.602 rule changes:**

Noted.

The comment is noted for future rulemaking activities on CIVP.

Following the public consultation phase, the 2x.602 rule changes and their associated AMC were largely reshaped and proposed for a restricted online consultation with the major stakeholders during a dedicated webinar session on the Continued Integrity Verification Program (CIVP) concept introduced in NPA 2022-01, held on 28 November 2022.

In consideration of the outcomes, EASA agreed to withdraw this proposed rule pending further coordination, and:

- remove the CIVP from the regular update;
- amend the current CM-S-007 Issue 01 on the CIVP to complement the additional consolidated guidance already developed;
- have a dedicated RMT for CIVP to reach consensus and foster harmonisation.

Meanwhile, CM-S-007 Issue 01 will remain valid and will be implemented as required on a case-by-case basis.



- **On point 5: All Rule and AMC Changes:**

Noted.

Most of the proposed items already have a corresponding item in the 'EASA SSD/SEI combined list for Part 27 and 29 Rotorcraft Products' (e.g. CIVP / SEI #13-07, TBO / SEI #13-06, Engine restart capability / SEI # 01-02, Non-required equipment in the Primary Field of View / SEI # 01-03, Standard fasteners / SEI #03-08, Fuel Gauging Architecture / SEI #07-02, Unusable fuel / SEI #07-07, Turbine Engine induction system icing / SEI #08-01, etc.)

The additional advisory material is provided to ease the showing of compliance with the current CS requirements.

The resulting increase of the number of EASA SSDs and SEIs should then be limited.

comment 159

comment by: AIRBUS HELICOPTERS

All comments from Airbus Helicopters (AH) have been consolidated with GAMA. The comment on AMC1 29.1319 (item 38 - Cybersecurity) has also been consolidated by both GAMA and ASD.

Since the AH comments were entered into the EASA CRT tool before the consolidation with GAMA and ASD which was completed late, the AH comments will appear as a duplicate of the GAMA and ASD comments.

Therefore, **all AH comments can be ignored** as they have been consolidated and entered by GAMA and ASD into the EASA CRT tool.

response

Noted.

Comments from AH will point to the corresponding GAMA comments.

comment 194

comment by: Bell

Bell Textron comments are included with the comments provided by GAMA.

response

Noted

Comments from Bell Textron will point to the corresponding GAMA comments.

comment 207

comment by: European Helicopter Association

The NPA includes many changes some of which will increase cost and burden to European operators and maintainers. Changes that are supposed to be included in regular updates are only those changes that are non-complex and non-controversial, and also those that will have a negligible cost impact. Some changes in the NPA do not meet the criteria, and although not obvious, they will significantly impact operators with increased cost and burden.

response

Noted.



For the CVP: See the answer to comment 115 on point 4: 2x.602 rule changes.

For topics other than the CVP:

We agree on the general principle that ‘regular updates are only those changes that are non-complex and non-controversial’. However, we do not agree on this regular update being controversial and having significant cost impacts, since most of the proposed items were already part of existing Certification Memoranda and have already been published for consultation and implemented in the recent certification activities of the Agency.

Responses to the comments raised in the document on more specific items should help at understanding the intent of the rules and of the proposed Means of Compliance.

comment

213

comment by: *European Helicopter Association*

in relation to the changes we commented:

These need to be evaluated in their own merits with their own BIS and RMT to ensure that the increased cost and burden to operators and maintainers are properly justified.

response

Noted.

For the CVP: See the answer to comment 115 on point 4: 2x.602 rule changes.

For topics other than the CVP:

This is a generic comment on which we may agree.

However, most of the items are aimed at providing improved and consolidated advisory material or have already been published for consultation.

The clarifications provided in the document will help at understanding the intent of the rules and of the proposed Means of Compliance.

Based on the above, none of the items introduced in this NPA was deemed to deserve a BIS or a dedicated rulemaking task.

comment

217

comment by: *Bell*

Changes are being made to AMC based on CRIs and CMs which have not been uniformly applied and not harmonized with other major certification authorities. Whereas many changes are administrative in nature, there are changes contained within the NPA that have not been properly vetted for their impact safety vs the cost for development and implementation. Authorities wish for OEMs to develop newer and safer products, yet the regulatory expectation are continuously increasing to the point where design of newer aircraft is becoming impractical.

In addition, some of the new AMC provided is being added based on new EASA interpretations of existing rules that are different than past precedents. For example, the requirement for partitions between cabin and crew areas to be able to restrain cargo up to 12g is a new interpretation that has not previously been applied based on



	<p>the same CS-27/29 amendment levels. These types of changes should be made at the CS-27/29 level and not buried in AMC material due to the significant impact in cost vs safety benefit.</p> <p>Changes that can have a cost impact to the design and maintenance of rotorcraft must be vetted through the proper rulemaking process and are not appropriate for a CS regular update.</p>
<p>response</p>	<p>Noted.</p> <p>For the CIVP: See the answer to comment 115 on point 4: 2x.602 rule changes.</p> <p>For topics other than the CIVP:</p> <p>The general comment is noted, but not fully agreed since we see no item potentially making the design of newer aircraft impractical.</p> <p>Most of the items are aimed at providing improved and consolidated advisory material or have already been published for consultation. Others were included to introduce provisions for more flexible and modern design solutions, so saving certification time by avoiding recurrent CRIs to make them acceptable.</p> <p>Concerning the proposed Means of Compliance (MoC) for the substantiation of structural partitions between cabin and cargo or baggage compartments, the following aspects should be considered:</p> <ul style="list-style-type: none"> • this point was often lengthy debated because of the absence of clear design conditions applicable to the partition (only 2X.561 is referred); • this MoC would help at harmonising the interpretation of the requirement among applicants and at meeting the EASA expectations, so saving certification time; • it has to be noted that this is not the most demanding design condition that could have been selected. Indeed, it is an alleviating condition with respect to the ultimate inertial load factors specified in CS 2X.561 (b)(3) that would apply to the restrain system of the items of mass in the absence of the partition; • it is not preventing the applicants from proposing an alternative MoC to this interpretation for their design solutions.
<p>comment</p>	<p>218 comment by: <i>Bell</i></p> <p>Regular updates are acceptable when the topic is not complex and not controversial. Many of the items added in the update are indeed not complex and not controversial, however there are some that are complex and very controversial and should be addressed through dedicated RMTs and NPAs with the appropriate impact assessments.</p>
<p>response</p>	<p>Noted.</p>



For the CIVEP: See the answer to comment 115 on point 4: 2x.602 rule changes.

For topics other than the CIVEP:

We agree on the general principle that 'regular updates are only those changes that are non-complex and non-controversial'. However, we do not agree on this regular update being controversial and having significant cost impacts, since most of the proposed items were already part of existing Certification Memoranda and have already been published for consultation and implemented in the recent certification activities of the Agency.

Responses to the comments raised in the document on more specific items should help at understanding the intent of the rules and of the proposed Means of Compliance.

None of the items introduced in this NPA was deemed to deserve a BIS or a dedicated rulemaking task.

comment	<p>325 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>The General Aviation Manufacturers Association (GAMA) greatly appreciates the opportunity to provide comments on NPA 2022-01. 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>Thank you for your feedback.</p>

comment	<p>326 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>General Comment - General Aviation Manufacturers Association (GAMA)</p> <p><u>Justification</u></p> <p>Topics that were subject to special conditions and certification memorandum with a public consultation should be respectively eligible to the regular update at CS and AMC level to avoid recurrent CRIs in the future certification projects.</p> <p>However a significant part of the CRIs of Means of Compliance type may remain recurrent over years if not integrated at the opportunity of a regular update. A public consultation of these CRI MoC will normally occur first at the opportunity of the RU. In such cases the cost impact on the applicant may not have been subject of a prior adequate cost/benefit analysis and their introduction in the regular update should be accompanied by such analysis. The cost of saving certification time by avoiding recurrent CRIs management may also be taken into account in this exercise.</p> <p>Other modification of CS or AMC content that are administrative in nature or are introducing performance based objectives which allow a greater flexibility at AMC level are also acceptable candidate for a regular update.</p> <p>To summarize, there are some cases in this NPA where the consolidated GAMA position is to recommend the CS update to be deferred to the next appropriate dedicated rulemaking task because not enough justification material, in particular on the</p>
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	<p>cost/benefit aspect has been gathered and they will be identified in particular by a dedicated comment.</p> <p><u>Proposed resolution</u> Changes that can have a cost impact to the design and maintenance of rotorcraft must be vetted through the proper rulemaking process including rulemaking group discussion, as necessary, and are not appropriate for a CS regular update.</p>
response	<p>Noted.</p> <p>For the CIVP: See the answer to comment 115 on point 4: 2x.602 rule changes.</p> <p>For topics other than the CIVP:</p> <p>This is a generic comment on which we may agree. However, most of the items are aimed at providing improved and consolidated advisory material or have already been published for consultation. Others were included to introduce provisions for more flexible and modern design solutions, so saving certification time by avoiding recurrent CRIs to make them acceptable. The clarifications provided in this document will help at understanding the intent of the rules and of the proposed Means of Compliance. Based on the above, none of the items introduced in this NPA was deemed to deserve a BIS or a dedicated rulemaking task.</p>
comment	<p>327 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>General Comment on formatting - General Aviation Manufacturers Association (GAMA)</p> <p>AMC1 29.901 (d)(1) AMC1 29.607 (c) AMC1 27.610 AMC1 29.610 (c) AMC 1 29.613 (c) AMC1 27.613 AMC1 29.613 AMC1 29.1093 (b)(1)(i)</p> <p><u>Justification</u></p> <p>There seems to be format imprecisions in the text, mistyped references and wrong paragraph numbering.</p> <p><u>Proposed resolution</u></p> <p>EASA to correct the follow formatting mistakes:</p> <p>Change 1: AMC1 29.901(d)(1) Installation FRAGMENT CONTAINMENT 'This AMC supplements FAA AC 29.901 with regard ...'</p>

but it does not correspond to CS29.901 for which (d)(1) doesn't exist. When it in line with CS29.903(d)(1). It seems that there is a typo.

should be

AMC1 29.903(d)(1) Installation

FRAGMENT CONTAINMENT

This AMC supplements FAA AC 29.903 with regard to the credit that can be taken from engine manufacturer data substantiating the capability of the engine to contain fragments.

Change 2: Fix the paragraph numbering in AMC1 29.607 (c)

Change 3: AMC1 27/9.610 sentence 'each part the failure which implies potential catastrophic consequences...' to include the word 'of'. It should read: 'each part of the failure which implies potential catastrophic consequences'.

Change 4: AMC1 29.613 (c) makes a reference to CS 27.573 where it should be CS 29.573

Change 5: AMC1 27/29.613 makes a reference to 'existing Ads, etc.' where it should mean 'existing ADs , etc'

Change 6: AMC1 29.1093(b)(1)(i) makes a reference to CS 27.1093 (b)(1)(i) where it should be CS 29.1093 (b)(1)(i)

response

Accepted

Change 1 accepted: numbering has been updated;

Change 2 accepted: numbering has been fixed;

Change 3 accepted: typo corrected AMC1 27/29.610;

Change 4 accepted: reference updated;

Change 5 accepted: acronym updated in ADs;

Change 6 accepted: reference updated.

1. About this NPA

p. 5

comment

212

comment by: *Leonardo Helicopters*

Most of comments to present NPA from Leonardo Helicopters are addressed by GAMA/ASD consolidated comments.

response

Noted.

Comments from Leonardo Helicopters will point to the corresponding GAMA comments as applicable.

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

p. 10

comment

193

comment by: *GE Aviation*



	<p>Item 3:</p> <p>Comment: The AMC is referred as 29.901(d)(1) but CS 29.901(d) is related to the APU. Text of the AMC should be related to both to APU and Engine.</p>
response	<p>Accepted. The reference has been updated.</p>

CS 27.1458 Lightweight flight recorder

p. 16

comment	<p>8 comment by: AIRBUS HELICOPTERS</p> <p>About CS 27.1458.(a).(2) : "<i>it complies with point (d) of CAT.IDE.H.191 and point (d) of SPO.IDE.H.146 of Regulation (EU) No 965/2012.</i>"</p> <p>It is proposed by Airbus Helicopters to replace this paragraph CS 27.1458.(a).(2) as follows :</p> <p><u>PROPOSED TEXT :</u> "<i>It automatically starts to record prior to the rotorcraft being capable of moving under its own power and automatically stops to record after the rotorcraft is no longer capable of moving under its own power;</i>"</p> <p><u>AH JUSTIFICATION :</u> AH recommends adding a plain text for the requirement rather than referring an OPS regulation which is not part of a H/C certification basis. In addition, it will help further foreign validations. AH recommends as well to be consistent with existing CRI and to stay performance oriented rather than solution prescriptive. In addition, AH recommends that point (d) of CAT.IDE.H.191 and point (d) of SPO.IDE.H.146 of Regulation (EU) No 965/2012 mirror the same text that the one proposed by AH in CS 27.1458.(a).(2). Indeed, technical conditions about installed equipment should be provided in the Airworthiness regulation (ie. CS-27 in the case of LDR) and then, cross-linked in the applicable operational regulations. In addition, the certification procedure can be applied such as ESF when necessary. Compliance with the same requirement in the Operational regulation is complex, even not possible, by the Operator which has to rely on the compliance carried out by the OEM for this requirement.</p>
response	<p>Noted</p> <p>Refer to comment #121 (duplicated comment with GAMA).</p>
comment	<p>117 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>CS 27.1458</p> <p><u>Justification</u></p>



response

The NPA proposes a LDR solution that is beyond what is recommended in ICAO Annex 6 and was envisioned based on CAT.IDE.H.191 and SPO.IDE.H.146 of Regulation (EU) No 965/2012.

Proposed text

NPA should ensure cost effective alignment with ICAO Annex 6 and CAT.IDE.H.191 and SPO.IDE.H.146 of Regulation (EU) No 965/2012 to allow for simpler means to meet the stated objectives.

Not accepted.

CS 27.1458 contains essential requirements for a lightweight flight data recorder to meet its intended purpose. Most of its requirements are aligned with CAT.IDE.H.191 and are stating objectives. More specifically:

- CS 27.1458(a)(1) is a non-prescriptive installation requirement that is needed to implement point (d) of AMC1 CAT.GEN.MPA.195(b). ED-155 §2-1.4 specifies that such means is needed.
- CS 27.1458(a)(2) directly refers to CAT.IDE.H.191 and SPO.IDE.H.146 of Regulation (EU) No 965/2012.
- CS 27.1458(b) is a non-prescriptive requirement that is essential for ensuring that the choice of the flight recorder location on the aircraft will not defeat the purpose of the flight recorder, which is to preserve recorded information for investigation purposes after an accident. CS 27.1458(b) is consistent with ED-155 §2-5.4.1
- CS 27.1458(c)(1) is a requirement essential for visually locating a flight recorder on an accident scene. It is applicable to all types of flight recorders (FDR, CVR, DLR, lightweight flight recorder, deployable or not deployable), and it is consistent with ED-155 § 2-1.14.4
- CS 27.1458(c)(2) is a non-prescriptive requirement, which is consistent with the minimum dimensions required per ETSO-2C197.
- CS 27.1458(d) is consistent with CAT.IDE.H.191(b) and SPO.IDE.H.146 (b) of Regulation (EU) No 965/2012.
- CS 27.1458(e) is a non-prescriptive requirement and it must be met for the installation to comply with CAT.IDE.H.191(b) and SPO.IDE.H.146(b) of Regulation (EU) No 965/2012.
- CS 27.1458(f) is consistent with CAT.IDE.H.191(e) and SPO.IDE.H.146(e) of Regulation (EU) No 965/2012.

comment

119

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

CS 27.1458

Justification

The proposed CS 27.1458 proposes a prescriptive means of recording and storing flight data. The non-prescriptive requirement is to ensure that certain flight data is retrievable post flight. The means to achieve this can be through several methods that meet the same intent as the prescriptive means that are written in the NPA. For



	<p>example, data could be recorded and by existing avionics systems and uploaded in real-time to a cloud. Data obtained in this fashion would also meet the intent of CS 27.1458</p> <p><u>Proposed resolution</u> CS 27.1458 should provide a set of non-prescriptive requirements which identify the type of data to be recorded and that is retrievable post-accident. The means by which this can be accomplished should be identified either within the AMC or future MOC which is proposed by applicants and accepted by EASA</p>
response	<p>Partially accepted.</p> <p>While EASA recognises that other technologies might permit retrieval of flight information fulfilling the need for investigation authorities, points CAT.IDE.H.191 and SPO.IDE.H.146 of Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations require that the aircraft is equipped with a lightweight flight recorder, not with a system transmitting data on ground. CS 27.1458 is only applicable to ‘flight recorders required by Regulation (EU) No 965/2012’. However, for consistency with CS-29 and to make the text more sustainable, the words ‘required by Regulation (EU) 965/2012’ are replaced by ‘required by the applicable EU operating rules’</p>
comment	<p>120 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 27.1458 (a) (1)</p> <p><u>Justification</u> The concept of “pre-flight check” is vague. Item (a)(1) requires an aural or visual means for pre-flight checking of the recorder for proper recording of data in the storage medium. The requirement is overly prescriptive and complex for a LDR and is not clear whether the requirement can be met by a bit-check or if more complex means is needed.</p> <p><u>Proposed resolution</u> Clarify the intent of the requirement and provide AMC.</p>
response	<p>Not accepted</p> <p>AMC1 27.1458(a) refers to EUROCAE ED-155, and ED-155 §2-1.4 lists acceptable means to monitor proper recording of information in the recording medium.</p>
comment	<p>121 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 27.1458 (a)(2)</p> <p><u>Justification</u></p> <p>With respect of CS 27.1458 (a)(2) <i>'it complies with point (d) of CAT.IDE.H.191 and point (d) of SPO.IDE.H.146 of Regulation (EU) No 965/2012'</i>, GAMA would like to recommend EASA:</p>

a) adding a plain text for the requirement rather than referring an OPS regulation which is not part of a H/C certification basis. In addition, it will help further foreign validations.

b) being consistent with existing CRI and to stay performance oriented rather than solution prescriptive.

c) rewording CS 27.1458 (a)(2) as proposed - "It automatically starts to record prior to the rotorcraft being capable of moving under its own power and automatically stops to record after the rotorcraft is no longer capable of moving under its own power;"

d) to consider mirroring the proposed text above for future regulatory updates of CAT.IDE.H.191 (d) and SPO.IDE.H.146 (d) in Reg. 965/2012. Indeed, technical conditions about installed equipment should be provided in the Airworthiness regulation (ie. CS-27 in the case of LDR) and then, cross-linked in the applicable operational regulations. In addition, the certification procedure can be applied such as ESF when necessary. Compliance with the same requirement in the Operational regulation is complex, even not possible, by the Operator which has to rely on the compliance carried out by the OEM for this requirement.

Proposed resolution

EASA to reword CS 27.1458 (a)(2) as follows:

"It automatically starts to record prior to the rotorcraft being capable of moving under its own power and automatically stops to record after the rotorcraft is no longer capable of moving under its own power;"

response

Partially accepted.

The text of CS 27.1458(a)(2) has been modified as suggested. As anticipated by the commenter, the operational regulation cannot be modified by this rulemaking task.

The resulting text is 'it automatically starts to record prior to the rotorcraft being capable of moving under its own power and automatically stops to record after the rotorcraft is no longer capable of moving under its own power.'

comment

122

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

CS 27.1458 (f)

Justification

The safety objective of the "erase" feature is not understood. CS 27.1458 (f)(1) should be moved to AMC so that it is only applicable when the function is installed as required by CAT.IDE.191 (e)

Proposed resolution



response	<p>If there is no safety rationale for the erase feature, the requirement should be moved from CS27.1458 to AMC 27.1458.</p> <p>Not accepted</p> <p>EASA disagrees that the requirement should be contained in the AMC. CS 27.1457(f) already contains the condition 'if the lightweight flight recorder in point (a) records images or audio of the flight crew'.</p>
comment	<p>123 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 27.1458 (d)</p> <p><u>Justification</u> Reference is provided to the specific operating rule which could change in the future.</p> <p><u>Proposed resolution</u> The parameters to be recorded should be included in AMC to CS 27.1458 to avoid ambiguity.</p>
response	<p>Partially accepted</p> <p>The operator of the helicopter must comply with the applicable operating rule. There is no ambiguity as the date of application will freeze the certification basis, and thus the applicable list of parameters at that time. Further evolution of the operational regulation will have to be supported by aircraft changes with corresponding evolutions of the list of parameters. However, for consistency of wording with other CS books and to make the wording of point (d) more sustainable, 'as required in Regulation (EU) No 965/2012' was replaced by 'as required by the applicable operating rules'.</p> <p>The resulting text is 'Each flight parameter to be recorded as required by the applicable operating rules must be recorded as digital data or by means of images.'</p>
comment	<p>208 comment by: <i>European Helicopter Association</i></p> <p>Item 1: Lightweight flight recorders: the changes to CS-27 and CS-29 and AMC/GM will increase the cost of lightweight flight recorders from what has been assumed based on the information that is provided in the operational rules and applicable AMC. The NPA adds prescriptive system requirements and the need for crash-protected systems which increases complexity and therefore increases cost for operators.</p>
response	<p>Not accepted</p> <p>See the answer to comments #117 and #219.</p>
comment	<p>216 comment by: <i>Bell</i></p> <p>CS 27.1458 does not meet the criteria of not complex and not controversial. The requirements that have been included go beyond what was envisioned based on CAT.IDE.H.191 and SPO.IDE.H.146 of Regulation (EU) No 965/2012. The impact to</p>

response	<p>TC/STC applicants and small operators should be assessed more thoroughly in a dedicated NPA.</p> <p>Remove CS 27.1458 from the NPA and initiate a dedicated RMT with the appropriate cost impact analysis to ensure that impact to TC/STC applicants and small operators is properly assessed.</p> <p>Not accepted</p> <p>See the answer to comment #117.</p>
comment	<p>219 comment by: <i>Bell</i></p> <p>CS 27.1458(b)</p> <p>The NPA points towards the data recorder needing to have some level of crash hardening. Full crash hardening can double the cost and complexity of a LDR installation, and in many cases where there is no post-crash fire, lightweight systems without crash resistance can provide valuable data.</p> <p>Being as the crash resistance / crash hardening adds significant cost and complexity, the changes to CS 27.1458 should be vetted under a separate NPA with its own BIS and impact assessment. Otherwise, the references to crash protection should be removed from the NPA.</p>
response	<p>Not accepted</p> <p>The crash resistance of the recording medium is consistent with AMC1 CAT.IDE.H.191(d), which indicates either ED-112 or ED-155 as acceptable standards. ED-155 Chapter 2-4 specifies crash-testing conditions that are considered appropriate for helicopters required to carry a lightweight flight recorder according to CAT.IDE.H.191 (turbine-engine helicopters with a MTOW between 2 250 kg and 3 175 kg). These crash-testing conditions were determined in a coordinated standardisation effort between industry and authorities for the target objective. ICAO Annex 6 Part III also refers to ED-155 regarding specifications applicable to lightweight flight recorders.</p> <p>The text of the requirement has been slightly modified to harmonise the wording with CS 27.1457 and CS 27.1459.</p>

AMC1 27.1458 Lightweight flight recorder	p. 17
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comment	<p>9 comment by: <i>AIRBUS HELICOPTERS</i></p> <p>About AMC1 27.1458 (a) - General :</p> <p>Airbus Helicopters proposes to change the first sentence of this sub-paragraph (a) as follows :</p> <p><u>AH PROPOSED TEXT :</u></p> <p><i>"(a) General</i></p>
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The installation of a recorder by means of an ETSO authorisation against ETSO 2C197, ETSO 2C197 A1, ETSO C123b, ETSO C124b, ETSO C176 or ETSO C177 (or equivalent standards accepted by EASA) satisfies the approval requirement in CS 27.1458(a)."

AH JUSTIFICATION :

ETSO C123b is mentioned as satisfying the CS27.1458 whereas no CARS and no CVR are requested by the Operational Regulation requirement. The ETSO-2C197 A1 is considered as well as an acceptable ETSO to satisfy CS27.1458 in addition to ETSO-2C197. Therefore, AH suggests removing the reference to ETSO C123b and adding ETSO-2C197 A1 .

response Noted

Not considered as per comment #127 (duplicated comment with GAMA).

comment

10

comment by: AIRBUS HELICOPTERS

About AMC1 27.1458 (b) :

Airbus Helicopters suggests that EASA refers ED-112 and its applicable paragraphs in addition to ED-155 as follows :

AH PROPOSED TEXT :

"(b) Installation of the flight recorder system

The flight recorder system should be installed in accordance with the recommendations made in EUROCAE Document ED-155 Section 2-5.3 or in EUROCAE Document ED-112 Section 2-5.3. The recording medium container should be located and mounted in accordance with the specifications given in EUROCAE Document ED-155 Sections 2-5.4 and 2-5.5 or in EUROCAE Document ED-112 Section 2-5.4 and 2-5.5."

AH JUSTIFICATION :

ED-112 is notified as an acceptable EUROCAE document to show compliance with CS27.1458 as per AMC1 27.1458 (a). Therefore, AMC1 27.1458 (b) and AMC1 27.1458 (c)(1) should also mention the applicable paragraphs for installation of the recorder in the frame of ED112.

response Noted

Not considered as per comment #128 (duplicated comment with GAMA).

comment

11

comment by: AIRBUS HELICOPTERS

About AMC1 27.1458 (c)(1) :

Airbus Helicopters suggests that EASA refers ED-112 and its applicable paragraphs in addition to ED-155 as follows :

AH PROPOSED TEXT :



response	<p>" (1) A recording made during a flight should be evaluated to confirm that the recording of the data required by Regulation (EU) No 965/2012 is acceptable during all phases of flight where this data should be recorded. In the case of image recordings, refer to Section III-6.4 of ED-155 or to Section III-6.4 of ED-112."</p> <p>AH JUSTIFICATION : ED-112 is notified as an acceptable EUROCAE document to show compliance with CS27.1458 as per AMC1 27.1458 (a). Therefore, AMC1 27.1458 (b) and AMC1 27.1458 (c)(1) should also mention the applicable paragraphs for installation of the recorder in the frame of ED112.</p> <p>Noted</p> <p>Not considered as per comment #128 (duplicated comment with GAMA).</p>
comment	<p>12 comment by: AIRBUS HELICOPTERS</p> <p>About AMC1 27.1458 c.2.(ii) on page 18 : "<i>checking for the presence of any fault in the memory of the built-in-test feature of the recorder, if installed</i>".</p> <p>AH COMMENT : Airbus Helicopters suggests removing the paragraph AMC1 27.1458.c.2.(ii)</p> <p>AH JUSTIFICATION : AH considers this requirement as useless and there are no fail/ pass criteria to consider that points (c)(1) and (c)(2) of this AMC were satisfactorily addressed. For other systems, such requirement about built-in test feature is not used to demonstrate intended function and notably to show compliance with CS27.1301.</p>
response	<p>Noted</p> <p>Not considered as per comment #129 (duplicated comment with GAMA).</p>
comment	<p>13 comment by: AIRBUS HELICOPTERS</p> <p>About AMC1 27.1458 - Lightweight flight recorder - on page 17:</p> <p>AH COMMENT : There is no guidance available for dispatch with inoperative lightweight recorder (partial or total failure) whatever lightweight flight recorder is recording flight data or images. It is expected that a guidance is made available in the CS-MMEL and in CS-GEN-MMEL like it is provided today for FDR 31-31-1.</p>
response	<p>Noted</p> <p>CS-MMEL and CS-GEN-MMEL are not within the scope of RMT.0128. The comment will be considered when updating these CSs.</p>
comment	<p>124 comment by: General Aviation Manufacturers Association (GAMA)</p>

	<p>AMC1 27.1458</p> <p><u>Justification</u> The NPA also points to requiring a data recorder but there are avionics and other systems that record data. It is the act of recording data and reviewing data that is valuable, not just retrieving data post incident.</p> <p><u>Proposed resolution</u> The AMC should also expand on the value of using recorded data to proactively improve safety.</p>
response	<p>Not accepted</p> <p>The scope of CS 27.1458 is only the conditions applicable to the design of a lightweight flight recorder that is required by the EU air operating rules, meaning CAT.IDE.H.191. See the reply to comment #119.</p>
comment	<p>125 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Justification</u> There should be a description of what is considered an acceptable level for the fire and post impact resistance capability of the lightweight flight data recorder.</p> <p><u>Proposed resolution</u> If some level of crash hardening is required it should be clarified that ED-155 is the applicable standard.</p>
response	<p>Not accepted</p> <p>AMC1 27.1458 Lightweight flight recorder (a) refers to ETSO-2C197, ETSO-2C124c and ETSO-2C176a. ETSO-2C197 Minimum Operational Performance Specification refers to ED-155. ED-155 Chapter 2-4 specifies crash-testing and fire conditions. ETSO-2C124c and ETSO-2C176a Minimum Operational Performance Specification refers to ED-112. ED-112 Chapter 2-4 specifies crash-testing and fire conditions.</p>
comment	<p>126 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 CS 27.1458 (a)</p> <p><u>Justification</u> The AMC states “The installation of a recorder by means of an ETSO authorisation against...” Aircraft installations are not implemented by means of ETSOs.</p> <p><u>Proposed resolution</u> AMC to be reworded to state “The installation of a recorder meeting ETSO...”</p>
response	<p>Partially accepted</p> <p>EASA recognises that the wording is incorrect but has implemented a slightly different wording than the proposed one.</p>

The resulting text is 'The recorder installed to meet CS 27.1458(a) should be granted an ETSO authorisation in accordance with the following ETSOs or be compliant with at least one of the following standards: (...)'

comment 127 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 CS 27.1458 (a)

Justification

ETSO C123b is mentioned as satisfying the CS27.1458 whereas no CARS and no CVR requested by the Operational Regulation requirement.

The ETSO-2C197 A1 is considered as well as an acceptable ETSO to satisfy CS27.1458 in addition to ETSO-2C197.

Proposed resolution

GAMA suggests removing the reference to ETSO C123b and adding ETSO-2C197 A1 . It is proposed to change the first sentence of sub-paragraph (a) as follows :

"(a) General

"...ETSO authorisation against ETSO 2C197, ETSO 2C197 A1, ETSO C124b, ETSO C176 or ETSO C177 [...] in CS 27.1458 (a)."

response Partially accepted

EASA concurs that ETSO-C123C (Cockpit Voice Recorder Systems) is irrelevant. Similarly, ETSO-C177 (Datalink Recorder Equipment) does not appear relevant either. Hence, these ETSOs have been removed.

About ETSO-2C197 A1, the use of revision references with the format A1 denotes revisions that are considered equivalent. The A1 revision is then not listed.

The resulting list of standards is '(...): ETSO-2C197, ETSO C124b, ETSO C176 (or equivalent standards accepted by EASA).'

comment 128 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 CS 27.1458 (a), (b) and (c)(1)

Justification

ED-112 is notified as an acceptable EUROCAE document to show compliance with CS27.1458 as per AMC1 27.1458 (a). Therefore, AMC1 27.1458 (b) and AMC1 27.1458 (c)(1) should also mention the applicable paragraphs for installation of the recorder in the frame of ED112.

Proposed resolution

It is suggested that EASA refers ED-112 and its applicable paragraphs in addition to ED-155

"(b) Installation of the flight recorder system



	<p>The flight recorder system should be installed in accordance with the recommendations made in EUROCAE Document ED-155 Section 2-5.3 or in EUROCAE Document ED-112 Section 2-5.3. The recording medium container should be located and mounted in accordance with the specifications given in EUROCAE Document ED-155 Sections 2-5.4 and 2-5.5 or in EUROCAE Document ED-112 Section 2-5.4 and 2-5.5."</p> <p>(c)(1) "A recording made during a flight should be evaluated to confirm that the recording of the data required by Regulation (EU) No 965/2012 is acceptable during all phases of flight where this data should be recorded. In the case of image recordings, refer to Section III-6.4 of ED-155 or to Section III-6.4 of ED-112."</p>
response	<p>Noted</p> <p>EASA recognises that more detailed reference to ED-112 could be introduced in AMC 27.1458. However, given the cost of ED-112-compliant systems, ED-155-compliant systems are seen as a more credible option to comply with the operational regulation. On another hand, more detailed guidance has been provided for the installation of ED-155 recorders as they might be installed by smaller entities, with less experience of recorder installation.</p>
comment	<p>129 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 CS 27.1458 (c)(2)(ii)</p> <p><u>Justification</u> With respect to c.2.(ii) : "checking for the presence of any fault in the memory of the built-in-test feature of the recorder, if installed".</p> <p>GAMA considers this requirement is not useful as there is no fail/pass criteria to consider that points (c)(1) and (c)(2) of this AMC were satisfactorily addressed. For other systems, such requirement about built-in test feature is not used to demonstrate intended function and notably to show compliance with CS27.1301.</p> <p><u>Proposed resolution</u> GAMA suggests removing the paragraph AMC1 27.1458.c.2.(ii)</p>
response	<p>Partially accepted</p> <p>Point (c)(2)(ii) of AMC1 27.1458 has been reworded to make its objective clearer.</p> <p>The resulting text is ‘ if the recorder is fitted with a built-in-test feature, checking the absence of faults that may affect the performance of the recorder.’</p>
comment	<p>130 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 CS 27.1458 (d)</p> <p><u>Justification</u></p>

response	<p>The intent of AMC1 CS 27.1458 (d) is ambiguous. It is assumed that the intent is to clarify the need for the erase function when the camera can record the crew area.</p> <p><u>Proposed resolution</u> The AMC should be more specific about the intent of paragraph (d) and clarify whether this is related to interpretation of the recorded area that requires the erase function.</p> <p>Accepted</p> <p>The text of the first sentence of point (d) of AMC1 27.1458 has been modified to make it clear that it is explaining a term used in CS 27.1458.</p> <p>The resulting text is 'If there are no compartments to physically segregate the flight crew from the passengers, the term 'flight crew area' in CS 27.1458 should be understood as the area including: (...)'</p>
comment	<p>220 comment by: <i>Bell</i></p> <p>AMC1 27.1458 Para (a)(2) CS 27 VFR rotorcraft can be certified with a single electrical bus. Making reference to essential or emergency loads could add confusion.</p> <p>Change AMC1 27.1458(a)(2) to read: "The lightweight flight recorder should receive its electric power from the bus that provides the maximum reliability for operation."</p>
response	<p>Partially accepted</p> <p>Essential loads are defined by CS 27.1351(a)(1) where they are designated as 'load circuits essential for safe operation'. The operation of the recorder should be preserved in case some loads are shaded, unless essential loads are at stake. The wording of point (a)(2) of AMC1 27.1458 has been aligned with that of CS 27.1351.</p> <p>The resulting text is 'The lightweight flight recorder should receive its electric power from the bus that provides the maximum reliability for operation of the recorder without jeopardising supply to load circuits essential for safe operations.'</p>

AMC1 27.959 Unusable fuel supply

p. 19

comment	<p>14 comment by: <i>AIRBUS HELICOPTERS</i></p> <p>About the 4th paragraph of AMC1 27.959 on page 19 : "<i>In order to accept a demonstration by laboratory test with partial flight test, [...], knowing that in any case those ground simulated conditions would need correlation with flight test data.</i>"</p> <p>Airbus Helicopters suggests replacing this 4th paragraph as follows :</p> <p>AH PROPOSED TEXT : <i>"In order to accept a demonstration by laboratory test with partial flight or ground test, the applicant should demonstrate the ability of the proposed substantiation</i></p>
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method (bench testing, complemented by analysis and/or ground test) to cover the effects offered normally by the flight-testing environment."

AH JUSTIFICATION :

Using a bench test (tilting platform) has the advantage of giving access to unusable fuel values for a large range of attitude and pitch combinations. AH agrees that complementary analysis of flight data with low fuel is needed to confirm the representativeness of such bench testing of real flight conditions (apparent pitch and roll angles resulting from H/C attitude accelerations, attitudes changes rate), and that one ground test (at a given attitude), with the engines running, brings additional information about the first sign of malfunction. Simulation on the bench test of vibration or altitude pressure is however not easily achievable and does not bring any added value for the purpose of unusable volume assessment. Therefore, AH suggests a more objective-based wording in the same spirit than FAA AC 29-2c §§ 29.959 c.

response

Noted

Not considered as per comment #131 (duplicated comment with GAMA).

comment

16

comment by: AIRBUS HELICOPTERS

About the last sentence of the 2nd bullet in the penultimate paragraph of AMC1 27.959 : "*The conservatism factors should be agreed by EASA.*"

AH COMMENT :

Airbus Helicopters suggests to remove this sentence : "*The conservatism factors should be agreed by EASA.*"

AH JUSTIFICATION :

AH considers that this wording is prescriptive as it does not take into account the concept of level of Involvement (LOI). Test program classification as retained document should be part of the negotiation between EASA and the applicant.

response

Noted

Not considered as per comment #132 (duplicated comment with GAMA).

comment

131

comment by: General Aviation Manufacturers Association (GAMA)

AMC1 27.959 para (4)

Justification

Using a bench test (tilting platform) has the advantage of giving access to unusable fuel values for a large range of attitude and pitch combinations.

GAMA agrees that complementary analysis of flight data with low fuel is needed to confirm the representativeness of such bench testing of real flight conditions (apparent pitch and roll angles resulting from H/C attitude accelerations, attitudes changes rate), and that one ground test (at a given attitude), with the engines running, brings additional information about the first sign of malfunction. Simulation on the



bench test of vibration or altitude pressure is however not easily achievable and does not bring any added value for the purpose of unusable volume assessment.

Therefore, GAMA suggests a more objective-based wording in the same spirit than FAA AC 27-2c §§ 27.959 c.

Proposed resolution

In the 4th paragraph, it is proposed to change the text change as follows :

"In order to accept a demonstration by laboratory test with partial flight or ground test, the applicant should demonstrate the ability of the proposed substantiation method (bench testing, complemented by analysis and /or ground test) to cover the effects offered normally by the flight-testing environment.

response Accepted.
AMC1 27.959 has been revised accordingly.

comment 132 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 27.959 para (5), second bullet

Justification

About the sentence : "The conservatism factors should be agreed by EASA."

GAMA considers that this wording is prescriptive as it does not take into account the concept of level of Involvement (LOI). Test program classification as retained document should be part of the negotiation between EASA and the applicant.

Proposed resolution

It is suggested to remove the following sentence :

~~"The conservatism factors should be agreed by EASA."~~

response Accepted.
AMC1 27.959 has been revised accordingly.
The involvement of EASA will in any case be subject of project discussions and this kind of approach may be a novelty and understood as complex.

AMC1 29.959 Unusable fuel supply

p. 19

comment 15 comment by: *AIRBUS HELICOPTERS*

About the 3rd paragraph of AMC1 29.959 on page 19 : "*In order to accept a demonstration by laboratory test with partial flight test, [...], knowing that in any case those ground simulated conditions would need correlation with flight test data.*"

Airbus Helicopters suggests replacing this 3rd paragraph as follows :

AH PROPOSED TEXT :



	<p>"In order to accept a demonstration by laboratory test with partial flight or ground test, the applicant should demonstrate the ability of the proposed substantiation method (bench testing, complemented by analysis and/or ground test) to cover the effects offered normally by the flight-testing environment."</p> <p>AH JUSTIFICATION : Using a bench test (tilting platform) has the advantage of giving access to unusable fuel values for a large range of attitude and pitch combinations. AH agrees that complementary analysis of flight data with low fuel is needed to confirm the representativeness of such bench testing of real flight conditions (apparent pitch and roll angles resulting from H/C attitude accelerations, attitudes changes rate), and that one ground test (at a given attitude), with the engines running, brings additional information about the first sign of malfunction. Simulation on the bench test of vibration or altitude pressure is however not easily achievable and does not bring any added value for the purpose of unusable volume assessment. Therefore, AH suggests a more objective-based wording in the same spirit than FAA AC 29-2c §§ 29.959 c.</p>
response	<p>Noted</p> <p>Not considered as per comment #133 (duplicated comment with GAMA).</p>

comment	<p>17 comment by: AIRBUS HELICOPTERS</p> <p>About the last sentence of the 2nd bullet in the penultimate paragraph of AMC1 29.959 on page 20 : "<i>The conservatism factors should be agreed by EASA.</i>"</p> <p>AH COMMENT : Airbus Helicopters suggests to remove this sentence : "<i>The conservatism factors should be agreed by EASA.</i>"</p> <p>AH JUSTIFICATION : AH considers that this wording is prescriptive as it does not take into account the concept of level of Involvement (LOI). Test program classification as retained document should be part of the negotiation between EASA and the applicant.</p>
response	<p>Noted</p> <p>Not considered as per comment #134 (duplicated comment with GAMA).</p>

comment	<p>133 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>AMC1 29.959 para (4)</p> <p><u>Justification</u> Using a bench test (tilting platform) has the advantage of giving access to unusable fuel values for a large range of attitude and pitch combinations.</p> <p>GAMA agrees that complementary analysis of flight data with low fuel is needed to confirm the representativeness of such bench testing of real flight conditions (apparent pitch and roll angles resulting from H/C attitude accelerations, attitudes changes rate), and that one ground test (at a given attitude), with the engines</p>
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running, brings additional information about the first sign of malfunction. Simulation on the bench test of vibration or altitude pressure is however not easily achievable and does not bring any added value for the purpose of unusable volume assessment.

Therefore, GAMA suggests a more objective-based wording in the same spirit than FAA AC 29-2c §§ 29.959 c.

Proposed resolution

In the 4th paragraph, it is proposed to change the text change as follows :

"In order to accept a demonstration by laboratory test with partial flight or ground test, the applicant should demonstrate the ability of the proposed substantiation method (bench testing, complemented by analysis and /or ground test) to cover the effects offered normally by the flight-testing environment.

response Accepted.
AMC1 29.959 has been revised accordingly.

comment 134 comment by: *General Aviation Manufacturers Association (GAMA)*
AMC1 27.959 para (5), second bullet

Justification

About the sentence: "The conservatism factors should be agreed by EASA."
GAMA considers that this wording is prescriptive as it does not take into account the concept of level of Involvement (LOI). Test program classification as retained document should be part of the negotiation between EASA and the applicant.

Proposed resolution

It is suggested to remove the following sentence:

~~"The conservatism factors should be agreed by EASA."~~

response Accepted.
AMC1 29.959 has been revised accordingly.
The involvement of EASA will in any case be subject of project discussions and this kind of approach may be a novelty and understood as complex.

AMC1 29.901(d)(1) Installation

p. 20

comment 18 comment by: *AIRBUS HELICOPTERS*

About AMC1 29.901(d)(1) Installation :

(c) Rotor containment at engine or APU level :

1st sentence of the 1st bullet : "*For engines, the containment capability is not required by CS-E and the corresponding data is not covered by the engine type certificate;*"

Airbus Helicopters suggests to add the following paragraph (d):



response	<p>AH PROPOSED TEXT : <i>"(d) blade-shedding containment at engine level For engines design for which the free power turbine includes a blade shedding concept, with associated containment casing, CS-E/FAR 33 requirements are in place and it can be expected that the data is covered by the engine type certificate issuance)."</i></p> <p>AH JUSTIFICATION : The statement <i>"For engines, the containment capability is not required by CS-E and the corresponding data is not covered by the engine type certificate"</i> is not fully understood as there is some certification material from FAA or EASA addressing, at engine level, the free turbine "blade-shedding" concept which includes a containment ring - See AC33-5, CS E-810. Therefore, in the frame of engine certification, whenever a "blade-shedding" concept is certified as such by an engine manufacturer, the engine certification process should clearly evidence for the helicopter manufacturer (through for example the engine installation manual) whether small debris are contained, or possibly released with a low energy. In addition, there is no paragraph dedicated to the "blade-shedding" concept, so it is proposed to introduce a new paragraph (d).</p> <p>Noted</p> <p>Not considered as per comment #136 (duplicated comment with GAMA).</p>
comment	<p>19 comment by: AIRBUS HELICOPTERS</p> <p>About the numbering of AMC1 29.901(d)(1) and about the 1st sentence of AMC1 29.901(d)(1) : <i>"This AMC supplements FAA AC 29.901 with regard to the credit that can be taken from engine manufacturer data substantiating the capability of the engine to contain fragments."</i></p> <p>Editorial : Airbus Helicopters suggests modifying the numbering of AMC1 29.901(d)(1) and the 1st sentence of AMC1 29.901(d)(1) as follows :</p> <p>AH PROPOSED TEXT : <i>"AMC1 29.903(d)(1) Installation FRAGMENT CONTAINMENT This AMC supplements FAA AC 29.903 with regard to the credit that can be taken from engine manufacturer data substantiating the capability of the engine to contain fragments."</i></p> <p>AH JUSTIFICATION : This is a typo. CS 29.901 (d)(1) does not exist and this AMC should be linked to CS 29.903 (d)(1) : <i>"Design precautions must be taken to minimise the hazards to the rotorcraft in the event of an engine rotor failure;"</i></p>
response	<p>Noted</p> <p>Not considered as per comment #327 (duplicated comment with GAMA).</p>
comment	<p>135 comment by: General Aviation Manufacturers Association (GAMA)</p> <p><u>Justification</u></p>

response	<p>It is not fully understood how the helicopter manufacturer can propose a mechanism to ensure that the data collated by the engine manufacturer is valid at the aircraft level.</p> <p><u>Proposed resolution</u> EASA to clarify and consider whether further guidance is needed to ensure proper interpretation.</p> <p>Noted. See the response to comment #136.</p>
comment	<p>136 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.901(d)(1) - b) and c)</p> <p><u>Justification</u> The statement "For engines, the containment capability is not required by CS-E and the corresponding data is not covered by the engine type certificate" is not fully understood as there is some certification material from FAA or EASA addressing, at engine level, the free turbine "blade-shedding" concept which includes a containment ring (see AC33-5, CS E-810.)</p> <p>Therefore, in the frame of engine certification, whenever a "blade-shedding" concept is certified as such by an engine manufacturer, the engine certification process should clearly evidence for the helicopter manufacturer (through for example the engine installation manual) if small debris are contained, or possibly released with a low energy.</p> <p>In addition, there is not paragraph dedicated to the "blade-shedding" concept, so it is proposed to introduce a new paragraph (d).</p> <p><u>Proposed resolution</u> EASA to include an additional paragraph to AMC1 29.901 (d)(1) on the 'blade-shedding' concept and the expectancy that the data is covered by the engine type certificate issuance. The following text is proposed:</p> <p>(d) blade-shedding containment at engine level "For engines design for which the free power turbine includes a blade shedding concept, with associated containment casing, CS-E/FAR 33 requirements are in place and it can be expected that the data is covered by the engine type certificate issuance)."</p>
response	<p>Partially accepted. The blade shedding concept has been introduced in the AMC by updating paragraph (b):</p> <ul style="list-style-type: none"> • 'a reinforced casing or blade shedding capability.' • 'This raises two issues' and the first sub-paragraph have been deleted.
comment	<p>137 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p>

	<p>AMC1 29.901(d)(1) - b) and c)</p> <p>AMC1 29.901(d)(1) para (b) requires clarification about use of engine data. Also, AMC1 29.901(d)(1) para (b) includes reference to DOA which is EU specific and would not apply to foreign applicants. The DOA reference should be removed.</p> <p><u>Proposed resolution</u></p> <p>Suggest that AMC1 29.901(d)(1) para (b) be revised as follows:</p> <p>"For engines, the containment capability is not required by CS-E and the corresponding data is not covered by the engine type certificate; if engine data is used, the helicopter manufacturer should propose a mechanism to ensure that the data is valid, under their DOA or by validation through the engine type certificate whereas for an APU, CS-ETSO requirements are in place, and it can be expected that the data is covered by the ETSO issuance)"</p>
response	<p>Partially accepted.</p> <p>The sub-agraph has been deleted in response to comment #136.</p>
comment	<p>190 comment by: <i>GE Aviation</i></p> <p>Item 3: Fragment containment</p> <p>Comment:</p> <p>The AMC is referred as 29.901(d)(1) but the CS 29.901(d) is related to the APU. Text of the AMC should be related to both APU and Engine.</p> <p>Suggested Resolution - Requested:</p> <p>Refer the AMC to CS 29.903(d)(1)</p> <p>Turbine engine installation. For turbine engine installations, (1) Design precautions must be taken to minimise the hazards to the rotorcraft in the event of an engine rotor failure; and ...</p>
response	<p>Accepted.</p> <p>The title 'AMC1 29.901(d)(1) Installation' has been changed to 'AMC1 29.903(d)(1) Engines'.</p>

AMC1 27.1337(b) Powerplant instruments	p. 21
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comment	<p>138 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.1337(b) para (2)</p> <p><u>Justification</u></p> <p>Clarification required.</p> <p><u>Proposed resolution</u></p>
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	Change to read: "As provided in CS-27, the fuel system shall be designed to resist to different types and levels of fuel contamination."
response	Noted. The GAMA proposal would have been agreed, but the sub-paragraph has been deleted in accordance with FAA comment #115 item 2.

AMC1 29.1337(b) Powerplant instruments

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comment	139 comment by: <i>General Aviation Manufacturers Association (GAMA)</i> AMC1 29.1337(b) para (2) <u>Justification</u> Clarification required. <u>Proposed resolution</u> Change to read: "As provided in CS-27, the fuel system shall be designed to resist to different types and levels of fuel contamination."
response	Noted. The GAMA proposal would have been agreed, but the sub-paragraph has been deleted in accordance with FAA comment #115 item 2.

AMC1 27.571 Fatigue evaluation of flight structure

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comment	20 comment by: <i>AIRBUS HELICOPTERS</i> About all the AMC1 27.571 : AH COMMENT : The scope of applicability of this AMC to "integral races" only should be clarified, without any mention to "drive system" or "transmission". AH JUSTIFICATION : Clarifications are needed : <ul style="list-style-type: none"> • either the AMC only deals with "integral races", and this should be clearly mentioned throughout the AMC, • or the AMC addresses any components subject to Rolling Contact Fatigue (RCF), and a dedicated (new?) requirement is probably preferable. In any case, why limit the scope of applicability to drive system?
response	Noted Not considered as per comment #159 (duplicated comment with GAMA – see comment #140).



comment	<p>22 comment by: AIRBUS HELICOPTERS</p> <p>About the note in AMC1 27.571(a)(1): <i>"Note: For the purposes of this AMC, it also includes combinations of rolling and sliding contact phenomena."</i></p> <p>AH COMMENT : Airbus Helicopters suggests that the following note be removed : <i>"Note: For the purposes of this AMC, it also includes combinations of rolling and sliding contact phenomena."</i></p> <p>AH JUSTIFICATION : Discussions were addressing only Safety Recommendation NORW-2018-003 limited to rolling contact phenomena. Going beyond this scope would require further discussions within a dedicated rulemaking task. Sliding contact phenomena is not part of the proposed AMC.</p>
response	<p>Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #142).</p>
comment	<p>24 comment by: AIRBUS HELICOPTERS</p> <p>About the 1st sentence of AMC1 27.571(c)(2) on page 23 : <i>"In order to make use of other methods such as CS 27.571(b) 'Fatigue tolerance evaluation' and CS 27.571(c) 'Replacement time evaluation', the applicant should select safe design allowables for aspects such as contact pressures that industry standards and know-how confidently identify as safe and capable of ensuring good levels of reliability."</i></p> <p>Airbus Helicopters suggests modifying this 1st sentence as follows :</p> <p>AH PROPOSED TEXT : "In order to make use of other methods such as CS 27.571(b) 'Fatigue tolerance evaluation' and CS 27.571(c) 'Replacement time evaluation', the applicant should select safe design allowables for aspects such as contact pressures that industry standards and know-how confidently identify as safe and capable of ensuring good levels of reliability that failure is extremely remote."</p> <p>AH JUSTIFICATION : The safety and the reliability requirements are redundant. The good levels of reliability seems less stringent than safe requirement. The text is proposed to be modified accordingly.</p>
response	<p>Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #144).</p>



comment	<p>25 comment by: AIRBUS HELICOPTERS</p> <p>About the 2nd sentence of the AMC1 27.571(c)(2) on page 23 : <i>"The applicant should verify that the selected allowables are suitable to ensure the integrity of the rotor drive system components in the operating conditions (temperature, lubrication, etc.) applicable to their design."</i></p> <p>Airbus Helicopters suggests modifying this sentence as follows :</p> <p>AH PROPOSED TEXT : <i>"The applicant should verify that the selected allowables are suitable to ensure the integrity of the rotor drive system components in the operating conditions (temperature, lubrication, cleanliness, etc.) applicable to their design."</i></p> <p>AH JUSTIFICATION : As cleanliness have an important role on the bearing reliability and as it is highly dependent of the manufacturing and maintenance of the gearbox, it should be added to the operating conditions.</p>
response	<p>Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #145).</p>

comment	<p>140 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>AMC1 27.571</p> <p><u>Justification</u> Either the AMCs are dealing with "integral races" only, which should be clearly mentioned in the text, or they address any component subject to RFC, and a dedicated (new?) requirement is probably preferable. In any case, why limiting the applicability scope to drive system?</p> <p><u>Proposed resolution</u> Clarify the scope of applicability of this AMC to "integral races" only, without mention to "drive system" or "transmission".</p>
response	<p>Partially Accepted.</p> <p>Rolling contact fatigue (RCF) affects some rotating parts transmitting loads by rolling contact (typically bearings and gears).</p> <p>This AMC addresses:</p> <ul style="list-style-type: none"> • portions of flight structure the failure of which could be catastrophic (for CS-27), • PSEs (for CS-29), <p>that are subject to RCF. The text of AMC1 27/29.571 has been modified to clarify this point (i.e. removing specific references to 'drive system' or 'transmission').</p>

CS 27/29.571 addresses fatigue in general and this should be then understood to include RCF. Therefore, no new requirement is considered needed to address this topic.

comment 142 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 27.571(a)(1)

Justification

With respect of the following AMC1 27.571(a)(1): "Note: For the purposes of this AMC, it also includes combinations of rolling and sliding contact phenomena."

Discussions were addressing only Safety Recommendation NORW-2018-003 limited to rolling contact phenomena. Going beyond this scope would require further discussions within a dedicated rulemaking task. Sliding contact phenomena is not part of the proposed AMC.

Proposed resolution

EASA to exclude from the scope of the AMC1 27.571 any reference or applicability to sliding contact phenomena by deleting the note on AMC1 27.571 (a)(1):

~~"Note: For the purposes of this AMC, it also includes combinations of rolling and sliding contact phenomena."~~

response Not accepted.

EASA refers to a combination of rolling and sliding. Typically, bearings and gear teeth operating contacts are not purely rolling contacts but a combination of rolling and sliding. The proposed definition is just intended to be a clarification of the physical phenomenon observed in contact areas. This AMC is thus only intended to provide guidance on this topic. Therefore, this note does not need to be removed.

Note: Proposing this new AMC for RCF does not mean that, for showing compliance with CS 27/29.571, other types of fatigue phenomena, occurring on parts submitted to pure sliding should not be considered. Typically, the impact of fretting (which may occur on contact areas submitted to sliding without rolling) on fatigue must be considered, when applicable, to show compliance with CS 27/29.571. The requirements already cover all types of fatigue and there is no need to add any requirement to cover this.

comment 144 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 27.571 (c)(2)

Justification

The safety and reliability requirements seem to be redundant in AMC1 27.571 (c)(2). Good levels of reliability, as proposed in the text, seems to be less stringent than safe requirements.

Proposed resolution



response	<p>EASA to consider updating the text as follows:</p> <p>"In order to make use of other methods such as CS 27.571(b) 'Fatigue tolerance evaluation' and CS 27.571(c) 'Replacement time evaluation', the applicant should select safe design allowables for aspects such as contact pressures that industry standards and know-how confidently identify as safe and capable of ensuring good levels of reliability that failing is extremely remote."</p> <p>Partially accepted.</p> <p>AMC1 27.571 has been modified and does no longer make reference to 'good levels of reliability'. Instead, it simply refers to 'avoid catastrophic failure', as in AMC1 29.571. This should be understood as simply referring to the objectives defined in CS 27.571.</p>
comment	<p>145 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.571 (c)(2)</p> <p><u>Justification</u> The text in AMC1 27.571 (c)(2) does not consider that cleanliness has an important role on the bearing reliability and that it is highly dependent of the manufacturing and maintenance of the gearbox.</p> <p><u>Proposed resolution</u> EASA to consider including a reference to the importance of 'cleaness' as proposed:</p> <p>"The applicant should verify that the selected allowables are suitable to ensure the integrity of the rotor drive system components in the operating conditions (temperature, lubrication, cleanliness, etc.) applicable to their design."</p>
response	<p>Accepted</p> <p>The list is aimed to be non-exhaustive but EASA accepts to add 'cleanliness' to emphasise its importance. The proposed changes to AMC1 27.571 are applied: '(temperature, lubrication, cleanliness, etc.)'</p>
comment	<p>147 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.571</p> <p><u>Justification</u> Trying to minimize the risk of crack initiation by minimizing contact stresses and other qualitative assertions to reduce the probability of a catastrophic failure is not a reliable method of enhancing safety, as most bearing contact fatigue spalling can occur at relatively low stresses due to corrosion or other race damage, and from material flaws such as subsurface material inclusions. The design should simply mitigate catastrophic failure modes by design.</p> <p><u>Proposed resolution</u> Designs should assume that spalling or other flaws will occur in integral roller raceways, regardless of RCF stress levels. Therefore, mitigation should be that the</p>

response	<p>underlying stress levels in the part do not propagate a crack into the core from a spall or flaw in the integral hardened case. If RCF stresses in combination with internal stresses in the core can propagate a crack through the section as determined by analysis and/or test, then the design should ensure by analysis and/or test that the gearbox will not lock up catastrophically and will continue to rotate with the ability to carry torque and with the ability to be detected by chip indication. Subsequent gearbox operation with a chip indication should be treated as any other chip indication with the appropriate emergency procedure specified in the RFM, such as reduce power and land as soon as possible.</p> <p>Not accepted.</p> <p>As already mentioned in AMC1 27.571 ‘The use of ‘fail-safe evaluation’ is recommended.’, which is basically the design concept detailed in the comment.</p> <p>Nevertheless, failures in general should be avoided and good design practices should be followed for this purpose. In other words, the fail-safe demonstration should not be taken in isolation and the applicant should minimise the risk of crack initiation due to RCF. AMC1 27.571 has been amended to mention that ‘For this purpose, steps should be taken to minimise the risk of crack initiation due to RCF on these components (and in particular for integrated bearings races), by...’.</p> <p>AMC1 27.571 has been also amended to mention that ‘In addition to a ‘fail-safe evaluation’, ‘replacement time’ and /or ‘fatigue evaluation’ may be needed in addition to fail-safe evaluation in order to ensure that the assumptions supporting the fail-safety and detection of failure remain valid throughout the operational life of the component’, to further clarify this point.</p>
comment	<p>149 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.571</p> <p><u>Justification</u></p> <p>The new AMC 27.571 material could be construed as requiring a fatigue and damage tolerance evaluation the equivalent of that required by 29.571 Amdt. 29-55 for integral bearing races and the current version of 27.571 does not contain the same requirements as that of 29.571.</p> <p><u>Proposed resolution</u></p> <p>If a 29.571 Amdt 29-55 type fatigue and damage tolerance evaluation is to be imposed for integral bearing races then the rule for 27.571 should be modified to require such and the impact of such a change evaluated through the the proper rulemaking process.</p>
response	<p>Not accepted.</p> <p>The intent of AMC1 27.571 is not to enforce CS 29.571 requirements for damage tolerance on CS-27 products. AMC1 27.571 strictly provides guidance for showing compliance with the existing requirements of CS 27.571. AMC1 27.571 and AMC2 29.571 have been reworded for clarity and to be more consistent with each other, allowing the TCH to identify the differences between the acceptable means of compliance.</p>



comment	<p>303 comment by: <i>Leonardo Helicopters</i></p> <p>Item #5, page 22</p> <p>For rolling contact fatigue, it is not clear if it is referred only to the integral race or to all the critical components that could be affected by rolling contact (i.e gears)</p> <p>Proposed solution: (1) Rolling contact fatigue (RCF): a form of fatigue that occurs due to the cyclic strains arising from the loading present during rolling contact between two parts of an assembly; <i>herein it is referred to the bearing race and the rolling element.</i></p>
response	<p>Partially Accepted.</p> <p>This AMC is not limited to bearing races and rolling elements. For instance, gears, due to the rolling/sliding contact between gear teeth, may be also affected by RCF. Therefore, this AMC is also applicable to such type of parts. AMC1 27.571 has been changed to clarify the scope of applicability. See also answer to comment #140.</p>
comment	<p>332 comment by: <i>Leonardo Helicopters</i></p> <p>ref. 27.571 (c)(1): "The use of 'fail-safe evaluation' [...] This demonstration should include <i>structural tests</i> and/or analyses to substantiate [...]"</p> <p>Comment: <i>Structural test</i> is not a good mean to support this demonstration. To define if the remaining structure is able to support the loads, the test is to be performed is a at flight envelop load --> load condition associated to the duration of the mission.</p> <p>It is not well defined which kind of analysis can be performed to give compliance instead of the test (crack propagation?)</p> <p>This section takes into consideration also the demonstration of the capability of the detection system, that is part of a different requirement (NPA of the chip detection).</p> <p>Proposed solution: "[...] This demonstration should include <i>functional tests</i> and/or analyses to substantiate [...]"</p>
response	<p>Partially accepted.</p> <p>It is correct that tests for fail-safe evaluation should be considered on some points as 'functional tests'. Nevertheless, referring to 'structural tests' is also considered appropriate as EASA also refers to strength-related tests, including for residual strength demonstrations when applicable. AMC1 27.571 has been changed as follows:</p>

“This demonstration should include **be performed as appropriate using experience from similar designs, functional tests, structural tests and/or reliable analyses** to substantiate that the fail-safe design objective has been achieved’.

comment 336 comment by: Andre Luis Garcia

AMC1 27.571, page 23

To be more emphatic in the rule: “The methodology should take into consideration points (1) and (2) below.”

Proposed solution:

“The methodology must take into consideration points (1) and (2) below.”

response Not accepted.
‘Should’ is used as the AMC is not prescriptive and other approaches may be proposed by applicants.

comment 337 comment by: Andre Luis Garcia

AMC1 27.571, page 23

To be more emphatic in the rule “ the applicant should select safe design allowables for aspects such as contact pressures that industry standards and know-how confidently identify as safe and capable of ensuring good levels of reliability. “

Proposed solution:

“ the applicant must select safe design allowables for aspects such as contact pressures that industry standards and know-how confidently identify as safe and capable of ensuring adequate levels of reliability. “

response Not accepted.
See the answer to comment #336.

AMC1 29.571 Fatigue tolerance evaluation of metallic structure

p. 23

comment 21 comment by: AIRBUS HELICOPTERS

About all the AMC1 29.571 :

AH COMMENT :

The scope of applicability of this AMC to "integral races" only should be clarified, without any mention to "drive system" or "transmission".

AH JUSTIFICATION :

Clarifications are needed :



	<ul style="list-style-type: none"> • either the AMC only deals with "integral races", and this should be clearly mentioned throughout the AMC, • or the AMC addresses any components subject to Rolling Contact Fatigue (RCF), and a dedicated (new?) requirement is probably preferable. <p>In any case, why limit the scope of applicability to drive system?</p>
response	<p>Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #141).</p>
comment	<p>23 comment by: AIRBUS HELICOPTERS</p> <p>About the note in AMC1 29.571(a)(1): <i>"Note: For the purposes of this AMC, it also includes combinations of rolling and sliding contact phenomena."</i></p> <p>AH COMMENT : Airbus Helicopters suggests that the following note be removed : <i>"Note: For the purposes of this AMC, it also includes combinations of rolling and sliding contact phenomena."</i></p> <p>AH JUSTIFICATION : Discussions were addressing only Safety Recommendation NORW-2018-003 limited to rolling contact phenomena. Going beyond this scope would require further discussions within a dedicated rulemaking task. Sliding contact phenomena is not part of the proposed AMC.</p>
response	<p>Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #143).</p>
comment	<p>26 comment by: AIRBUS HELICOPTERS</p> <p>About the 1st sentence of the 2nd paragraph of AMC1 29.571(c) on page 24 : <i>"Steps should be taken to minimise the risk of crack initiation due to RCF in integrated races by minimising contact stresses, specifying high standards for surface finishes, ensuring good lubrication and maintaining oil quality regardless of the fatigue tolerance approach selected."</i></p> <p>Airbus Helicopters suggests modifying this sentence as follows :</p> <p>AH PROPOSED TEXT : <i>"Steps should be taken to minimise the risk of crack initiation due to RCF in integrated races by minimising contact stresses, specifying high standards for surface finishes, ensuring good lubrication, guaranteeing gearbox cleanliness and maintaining oil quality regardless of the fatigue tolerance approach selected."</i></p> <p>AH JUSTIFICATION :</p>

	Maintaining oil quality does not ensure cleanliness of the delivered gearbox. Cleanliness should be added.
response	Noted Not considered as per comment #159 (duplicated comment with GAMA – see comment #146).
comment	141 comment by: <i>General Aviation Manufacturers Association (GAMA)</i> AMC1 29.571 <u>Justification</u> Either the AMCs are dealing with "integral races" only, which should be clearly mentioned in the text, or they address any component subject to RFC, and a dedicated (new?) requirement is probably preferable. In any case, why limiting the applicability scope to drive system? <u>Proposed resolution</u> Clarify the scope of applicability of this AMC to "integral races" only, without mention to "drive system" or "transmission".
response	Partially accepted. See the answer to comment #140.
comment	143 comment by: <i>General Aviation Manufacturers Association (GAMA)</i> AMC1 29.571(a)(1) <u>Justification</u> With respect of the following AMC1 29.571(a)(1): "Note: For the purposes of this AMC, it also includes combinations of rolling and sliding contact phenomena." Discussions were addressing only Safety Recommendation NORW-2018-003 limited to rolling contact phenomena. Going beyond this scope would require further discussions within a dedicated rulemaking task. Sliding contact phenomena is not part of the proposed AMC. <u>Proposed resolution</u> EASA to exclude from the scope of the AMC1 29.571 any reference or applicability to sliding contact phenomena by deleting the note on AMC1 29.571 (a)(1): "Note: For the purposes of this AMC, it also includes combinations of rolling and sliding contact phenomena."
response	Not accepted. See the answer to comment #142.
comment	146 comment by: <i>General Aviation Manufacturers Association (GAMA)</i>

	<p>AMC1 29.571 (c)</p> <p><u>Justification</u> The proposed text in AMC1 29.571 (c) doesn't seem to consider that maintaining oil quality does not ensure cleanliness of the delivered gearbox. Cleanliness should be added.</p> <p>AMC1 29.571(c): "Steps should be taken to minimise the risk of crack initiation due to RCF in integrated races by minimising contact stresses, specifying high standards for surface finishes, ensuring good lubrication and maintaining oil quality regardless of the fatigue tolerance approach selected."</p> <p><u>Proposed resolution</u> EASA to consider rewording AMC1 29.571 (c) as proposed:</p> <p>"Steps should be taken to minimise the risk of crack initiation due to RCF in integrated races by minimising contact stresses, specifying high standards for surface finishes, ensuring good lubrication, guaranteeing gearbox cleanliness and maintaining oil quality regardless of the fatigue tolerance approach selected."</p>
response	<p>Partially accepted.</p> <p>'Gearbox' cleanliness is too specific. Same for 'oil' quality. Therefore, AMC1 29.571 has been changed as follows: 'ensuring good lubrication, guaranteeing cleanliness and maintaining oil lubricant quality regardless of the fatigue tolerance approach selected.'</p>
comment	<p>148 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.571</p> <p><u>Justification</u> Trying to minimize the risk of crack initiation by minimizing contact stresses and other qualitative assertions to reduce the probability of a catastrophic failure is not a reliable method of enhancing safety, as most bearing contact fatigue spalling can occur at relatively low stresses due to corrosion or other race damage, and from material flaws such as subsurface material inclusions. The design should simply mitigate catastrophic failure modes by design.</p> <p><u>Proposed resolution</u> Designs should assume that spalling or other flaws will occur in integral roller raceways, regardless of RCF stress levels. Therefore, mitigation should be that the underlying stress levels in the part do not propagate a crack into the core from a spall or flaw in the integral hardened case. If RCF stresses in combination with internal stresses in the core can propagate a crack through the section as determined by analysis and/or test, then the design should ensure by analysis and/or test that the gearbox will not lock up catastrophically and will continue to rotate with the ability to carry torque and with the ability to be detected by chip indication. Subsequent gearbox operation with a chip indication should be treated as any other chip indication with the appropriate emergency procedure specified in the RFM, such as reduce power and land as soon as possible.</p>

response Not accepted.

As mentioned in AMC1 29.571, minimising contact stresses should be considered as part of ‘Steps [to] be taken to minimise the risk of crack initiation [...] regardless of the fatigue tolerance approach selected’. In any case, AMC1 29.571 already emphasises that ‘As it is difficult to totally preclude cracking initiated by RCF, a fail-safe approach is recommended wherever possible.’

comment 150 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 29.571, last paragraph

Justification

The reference to the CIVP is not necessary under AMC1 29.571 as it is proposed to be included under AMC1 29.602.

Proposed resolution

Remove reference to CIVP from AMC1 29.571.

response Noted.

The reference to the CIVP has been removed from AMC1 2x.571 as the CIVP has been removed from this regular update → See the answer to comment 115 on point 4: 2x.602 rule changes.

comment 333 comment by: *Leonardo Helicopters*

ref. page 24, AMC1 29.571 (c):

It is indicated to consider "combined effect" (RCF and other damage threats): it is not clear how to consider the combined effects, e.g. how many effects if more than RCF could affect the component?

If the combination of different effects bring to the same typology of failure, it is not necessary to combine them; the combination would only affect the time of initiation of the failure, but not its propagation.

It is instead different if the RCF combined with other damage would bring to a different typology of failure.

response Noted.

When referring to ‘combined effect’, the EASA intention was to refer to the consideration of damages/defects that may affect RCF. The presence of some damages/defects may affect the likelihood of RCF cracks initiating. In addition, the presence of some damages/defects may affect the crack paths and failure modes. All these aspects associated with the presence of damages/defects should be considered when evaluating parts under RCF. Nevertheless, this does not mean that all damages/defects need to be addressed; considering only the most critical ones (i.e. having a greater impact on the fatigue tolerance of the part under RCF) is considered appropriate.



AMC1 29.571 has been reworded for clarity: ‘The fatigue tolerance evaluation of principal structural elements (PSEs) should include, when applicable, the effect of RCF considering: [...]’

comment 334

comment by: *Leonardo Helicopters*

ref. page 24-25, AMC1 29.571 (c):

"A continued integrity verification program (CIVP) [...] throughout the operational life of the component."

Shall CIVP program be applied on all PSEs?

The requirement seems too generic: NPA refers to critical parts that have a catastrophic effect and PSE.

The perimeter of the requirement in the NPA should be better defined.

It is also necessary to define how the monitoring should be performed: e.g. take into account running hours? until when? which number of items shall be considered? etc.

response

Noted.

The comment is noted for future rulemaking activities on the CIVP.
See the answer to comment 115 on point 4: 2x.602 rule changes.

comment 338

comment by: *Andre Luis Garcia TCCA*

AMC1 29.571:

To be more emphatic in the rule: “Analysis, experience with similar designs and testing should be used to verify any assumptions related to..”

“Analysis, experience with similar designs and testing must be used to verify any assumptions related to..”

response

Not accepted.

‘Should’ is used as the AMC is not prescriptive and other approaches may be proposed by applicants.

AMC1 27.602 Critical parts

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comment 27

comment by: *AIRBUS HELICOPTERS*

About AMC1 27.602.(b)(1) : "The CIVP should assess the continued validity of assumptions made during certification [...] to comply with CS 27.571 and CS 27.573 through the life of the type design."



	<p>Airbus Helicopters suggests adding the following in bold and underlined to AMC1 27.602.(b)(1) :</p> <p><u>AH PROPOSED TEXT :</u> "(b) Procedures (1) The CIVP should assess the continued validity of assumptions made during certification regarding the condition and operation of critical parts in order to help ensure their continued integrity. This should include but not be limited to demonstration of the continuity of the effectiveness of design, maintenance and monitoring provisions (e.g. health monitoring, usage monitoring and safety devices) developed to comply with CS 27.571 and CS 27.573 through the life of the type design. <u>Should the applicant justify that sufficient experience already exists for some parts such that assessment within the CIVP would be of no benefit (typically due to similarity with other products, including their usage), these need not be included in the CIVP.</u>"</p> <p><u>AH JUSTIFICATION :</u> No more credit from existing H/C models to justify CIVP as mentioned in the CM-S-007 Issue_01 (Post Certification Actions to Verify the Continued Integrity of Rotorcraft Critical Parts) and EASA agreed in the CRIs raised for last TCs. AH recommends adding the possibility to take credit from existing H/C to justify CIVP.</p> <p>response Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #152).</p>
comment	<p>31 comment by: AIRBUS HELICOPTERS</p> <p>About the 2nd sentence of AMC1 27.602 (a) : <i>"In addition, it may also include other parts the failure of which could have a catastrophic effect upon the rotorcraft and for which no critical characteristics have been identified at the time of certification."</i></p> <p><u>AH COMMENT :</u> CS27.602(c) addresses integrity of critical parts. The definition of critical parts is given in CS 27.602(a): <i>"Critical part - A critical part is a part, the failure of which could have a catastrophic effect upon the rotorcraft, and for which critical characteristics have been identified which must be controlled to ensure the required level of integrity."</i> AMC1 27.602 (a) considers as well parts which were identified with no critical characteristics: <i>"In addition, it may also include other parts the failure of which could have a catastrophic effect upon the rotorcraft and for which no critical characteristics have been identified at the time of certification."</i> AMC1 27.602.(a) is not consistent with CS 27.602(c) when addressing parts without critical characteristics. This creates a mismatch in between CS 27.571 and CS 27.573 which are dealing with PSEs (i.e., parts with catastrophic failures).</p> <p>response Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #153).</p>

comment	<p>33 comment by: AIRBUS HELICOPTERS</p> <p>About the 3rd sentence of AMC1 27.602 (b)(3) on page 26 : "<i>In addition, the applicant should consider scheduling early evaluation opportunities to confirm the suitability of the inspection intervals scheduled at entry into service.</i>"</p> <p>Airbus Helicopters suggests deleting this sentence as follows :</p> <p>AH PROPOSED DELETION : "In addition, the applicant should consider scheduling early evaluation opportunities to confirm the suitability of the inspection intervals scheduled at entry into service."</p> <p>AH JUSTIFICATION : It is reminded that CIVP as proposed in CM-S-007 is Post Certification Actions to Verify the Continued Integrity of Rotorcraft Critical Parts. Thus, a verification after entry into service and not during the development phase. However, AH agrees that issues raised during the development can be used as inputs for the CIVP but without requiring a specific continued integrity verification programme plan (CIVPP) just for the development phase.</p>
response	<p>Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #164).</p>
comment	<p>116 comment by: Garmin International</p> <p>AMC1 27.602 (b)(3) Page 26 of 112:</p> <p>Regarding the statement, "To meet this objective an evaluation will need to be performed on at least one sample...", This statement is not clear with respect to the population of aircraft that the sample is taken from.</p> <p>Is this intended to convey a sample taken from a single rotorcraft throughout its life or is the sample to be obtained from a population of rotorcraft?</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>152 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>AMC1 27.602 (c)</p> <p><u>Justification</u> The proposed text appears to not consider credit from existing H/C models to justify CIVP as mentioned in the CM-S-007 Issue_01 - Post Certification Actions to Verify the</p>

Continued Integrity of Rotorcraft Critical Parts and EASA agreed in the CRIs open for last TCs.

Proposed resolution

EASA to align the applicability of AMC1 27.602 with that recognised within the CM-S-007, specially with the possibility to take credit from experience for some critical parts. The following text is proposed:

[...]

(b) Procedures

(1) The CIVP should assess the continued validity of assumptions made during certification regarding the condition and operation of critical parts in order to help ensure their continued integrity. This should include but not be limited to demonstration of the continuity of the effectiveness of design, maintenance and monitoring provisions (e.g. health monitoring, usage monitoring and safety devices) developed to comply with CS27.571 and CS27.573 through the life of the type design.

Should the applicant justify that sufficient experience already exists for some parts such that assessment within the CIVP would be of no benefit (typically due to similarity with other products, including their usage), these need not be included in the CIVP

(2) The following data can be used to support the CIVP:

...]

response

Noted.

The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.

comment

153

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

AMC1 27.602 (a)

Justification

CS 27.602(c) addresses integrity of critical parts. The definition of critical parts is given in CS27.602 (a): [... A critical part is a part, the failure of which could have a catastrophic effect upon the rotorcraft, and for which critical characteristics have been identified ...]

AMC1 27.602 (a) considers as well parts which were identified with no critical characteristics: [...In addition, it may also include other parts the failure of which could have a catastrophic effect upon the rotorcraft and for which no critical characteristics have been identified at the time of certification. ...]



response	<p>There is an inconsistency between CS27.602 (c) and AMC1 27.602 (a). This creates a mismatch in between CS 27.571 and CS 27.573 which are dealing with PSEs (i.e., parts with catastrophic failures).</p> <p><u>Proposed resolution</u> EASA to correct the inconsistency.</p> <p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>160 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.602 (b)(2)</p> <p><u>Justification</u> All elements under (b)(2) may / or may not be applicable.</p> <p><u>Proposed resolution</u> EASA to revise as follows:</p> <p>“The following data can be used to support the CIVP if applicable:”</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>162 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.602 (b)(3)</p> <p><u>Justification</u> The section provides a prescriptive means to execute a CIVP. Different OEMs will have different means to meet CS 27.602(c) which should not be bound by the AMC. The Applicant is required to establish a CIVP that meets the intent of CS 27.602(c) so the prescriptive AMC in paragraph (b)(3) is redundant and too restrictive and more appropriate for GM.</p> <p><u>Proposed resolution</u> EASA to delete AMC1 27.602 (b)(3).</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>164 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p>

response	<p>AMC1 27.602 (b)(4)</p> <p><u>Justification</u> The paragraph (b)(3) does not fully reflect the CM-S-007 that is supposedly being transposed. The CIVP are post certification actions intended to verify the continued integrity of Rotorcraft Critical Parts. Therefore, it refers to verifications after entry into service and not during the development phase. Issues raised during the development can be used as inputs for the CIVP but there should not be a need to require a CIVPP for the development phase.</p> <p><u>Proposed resolution</u> EASA to consider removing the following sentence in AMC1 27.602 (b)(4):</p> <p>'[...in addition, the applicant should consider scheduling early evaluation opportunities to confirm the suitability of the inspection intervals scheduled at entry into service...]</p> <p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>166 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.602 (b)(4)</p> <p><u>Justification</u> The section (b)(4) identifies the need for a plan, but there are aspects that would not be suitable for a non-EASA TC holder. Continued airworthiness is the responsibility of the State of Design and the CIVP is generated to ensure continued airworthiness / integrity.</p> <p><u>Proposed correction</u> EASA to either clarify the relationship with EASA is for EU TC holders or remove the language that talks to need to have a relationship with the Agency.</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p> <p>.</p>
comment	<p>168 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.602 (b)(4)</p> <p><u>Justification</u></p>

	<p>The elements of a CIVP can be embedded within existing company processes and will be defined within a CIVPP. The prescriptive means in paragraph (b)(4) is too restrictive and more appropriate for GM.</p> <p><u>Proposed resolution</u> EASA to reshape AMC1 27.602 (b)(4), by only keeping the CIVPP considerations.</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>339 comment by: <i>Andre Luis Garcia TCCA</i></p> <p>AMC1 27.602 (b)(1)</p> <p><u>Justification</u> To be more emphatic in the rule: "The CIVP should assess the continued validity of assumptions made during certification regarding the condition ... This should include but .." <u>Proposed resolution</u> "The CIVP must assess the continued validity of assumptions made during certification regarding the condition ...This must include but "</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>

CS 27.602 Critical parts

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comment	<p>151 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 27.602</p> <p><u>Justification</u> It is understood from the proposed text that EASA is asking for a dedicated monitoring function to be set up.</p> <p><u>Proposed resolution</u> EASA to clarify whether this interpretation is correct, and if yes, consider making it clearer within the proposed text. Also, EASA to clarify if this dedicated monitoring function would involve also operators.</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>



comment	<p>157 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 27.602 (c)</p> <p><u>Justification</u> The use of “should” is not appropriate in CS 27.602(c).</p> <p>“As part of the process of compliance with this paragraph, a continued integrity verification programme (CIVP) must be developed. The CIVP should ensure the continued validity of assumptions made during certification that could affect the integrity of critical parts.”</p> <p><u>Proposed resolution</u> EASA to revise as follows:</p> <p>“As part of the process of compliance with this paragraph, a continued integrity verification programme (CIVP) must be developed. The CIVP should ensure the continued validity of assumptions made during certification that could affect the integrity of critical parts.”</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>209 comment by: <i>European Helicopter Association</i></p> <p>Item 6: Critical Parts: The change adds a requirement for manufacturers to introduce a Continued Integrity Verification Programme (CIVP) and a significant part of this program will place requirements on operators and maintainers to monitor critical parts and provide reports to the manufacturers. The additional effort for operators and maintainers needs to be thoroughly assessed to ensure the increased burden is commensurate with the assumed safety benefits.</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>221 comment by: <i>Bell</i></p> <p>Although the concept of CIVP has been discussed through CRIs and CMs, the regulatory need to have a CIVP as defined in the NPA will add significant cost to TC Applicants and Holders and operators, and this additional burden has not been</p>

response	<p>assessed. Requirement does not meet the criteria of not complex and not controversial.</p> <p>Remove CS 27.602(c) from the NPA and initiate a dedicated RMT with the appropriate cost impact analysis to ensure that impact to TC Applicants/ Holders and small operators is properly assessed</p> <p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>328 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 27.602 (c)</p> <p><u>Justification</u></p> <p>Although the concept of CIVP has been discussed through CRIs and CMs, the regulatory need to have a CIVP as defined in the NPA will add significant cost to TC Applicants and Holders and operators, and this additional burden has not been assessed. Requirement does not meet the criteria of not complex and not controversial.</p> <p>The CIVP has been addressed through an EASA certification memorandum, a document intended to provide guidance. The CIVP EASA CM has been then transferred within a CRI MoC which describes the means and method how compliance will be demonstrated to an applicable CS in an acceptable way. EASA WI.CERT.00146-001 document states that a MoC CRI shall not introduce new or alleviate applicable CS, SC.</p> <p>Furthermore the AMC content indicates other than critical parts may be subject to CIVP. This is then implicitly extending the scope of the x.609 to other than critical parts and should be subject of a robust rationale and proper impact assessment.</p> <p>Last but not least, the status of the CIVPP and related maintenance instructions, vs. the ICA within the scope of the 21.A.41 Type Certificate and more generally Part-21 and Part-M & Part-CAMO or event Part-26, as applicable should be considered to ensure roles and responsibilities in CIVP are properly cascaded in the regulations.</p> <p><u>Proposed resolution</u></p> <p>EASA to remove CS 27.602(c) from the NPA and initiate a dedicated RMT with the appropriate cost impact analysis to ensure that impact to TC Applicants/ Holders and small operators is properly assessed.</p>
response	<p>Noted.</p> <p>1st point: Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p> <p>.</p>



2nd point:

The point raised is not linked to this NPA but to a CRI MoC opened in the frame of an application. The TCH should discuss this point with EASA in the frame of its application(s).

In any case, it is true that the CRI MoC mentioned did not introduce 2x.602(c). Nevertheless, it is considered necessary to clarify EASA's expectation to perform a CIVP in compliance with 2x.602.

This is considered a critical element towards ensuring the integrity of critical parts throughout their service life, which is already within the scope of the existing requirement.

3rd point:

The comment is noted for future rulemaking activities on the CIVP.

See the answer to comment 115 on point 4: 2x.602 rule changes.

4th point:

The comment is noted for future rulemaking activities on the CIVP.

See the answer to comment 115 on point 4: 2x.602 rule changes.

CS 29.602 Critical parts

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comment	156	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	CS 29.602	
	<u>Justification</u>	
	It is understood from the proposed text that EASA is asking for a dedicated monitoring function to be set up.	
	<u>Proposed resolution</u>	
	EASA to clarify whether this interpretation is correct, and if yes, consider making it clearer within the proposed text. Also, EASA to clarify if this dedicated monitoring function would involve also operators.	
response	Noted.	
	The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.	
comment	158	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	CS 29.602 (c)	
	<u>Justification</u>	
	The use of "should" is not appropriate in CS 29.602(c).	

response	<p>“As part of the process of compliance with this paragraph, a continued integrity verification programme (CIVP) must be developed. The CIVP should ensure the continued validity of assumptions made during certification that could affect the integrity of critical parts.”</p> <p><u>Proposed resolution</u> EASA to revise as follows:</p> <p>“As part of the process of compliance with this paragraph, a continued integrity verification programme (CIVP) must be developed. The CIVP should ensure the continued validity of assumptions made during certification that could affect the integrity of critical parts.”</p> <p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>222 comment by: <i>Bell</i></p> <p>Although the concept of CIVP has been discussed through CRIs and CMs, the regulatory need to have a CIVP as defined in the NPA will add significant cost to TC Applicants and Holders and operators, and this additional burden has not been assessed. Requirement does not meet the criteria of not complex and not controversial.</p> <p>Remove CS 29.602(c) from the NPA and generate a dedicated RMT with the appropriate cost impact analysis to ensure that impact to TC Holders/ Applicants and small operators is properly assessed.</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>329 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 29.602 (c)</p> <p><u>Justification</u> Although the concept of CIVP has been discussed through CRIs and CMs, the regulatory need to have a CIVP as defined in the NPA will add significant cost to TC Applicants and Holders and operators, and this additional burden has not been assessed. Requirement does not meet the criteria of not complex and not controversial. The CIVP has been addressed through an EASA certification memorandum, a document intended to provide guidance. The CIVP EASA CM has been then transferred within a CRI MoC which describes the means and method how compliance will be demonstrated to an applicable CS in an acceptable way. EASA WI.CERT.00146-001 document states that a MoC CRI shall not introduce new or alleviate applicable CS, SC.</p>

Furthermore the AMC content indicates other than critical parts may be subject to CIVP. This is then implicitly extending the scope of the x.609 to other than critical parts and should be subject of a robust rationale and proper impact assessment. Last but not least, the status of the CIVPP and related maintenance instructions, vs. the ICA within the scope of the 21.A.41 Type Certificate and more generally Part-21 and Part-M & Part-CAMO or event PArt-26, as applicable should be considered to ensure roles and responsibilities in CIVP are properly cascaded in the regulations.

Proposed resolution

EASA to remove CS 29.602(c) from the NPA and initiate a dedicated RMT with the appropriate cost impact analysis to ensure that impact to TC Applicants/ Holders and small operators is properly assessed.

response

Noted.

The comment is noted for future rulemaking activities on the CIVP.
See the answer to comment 115 on point 4: 2x.602 rule changes.

AMC1 29.602 Critical parts

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comment

28

comment by: AIRBUS HELICOPTERS

About AMC1 29.602.(b)(1) : "*The CIVP should assess the continued validity of assumptions made during certification [...] to comply with CS 29.547(b), CS 29.571, CS 29.573 and CS 29.917(b) through the life of the type design.*"

Airbus Helicopters suggests adding the following in bold and underlined to AMC1 29.602.(b)(1) :

AH PROPOSED TEXT :

"(b) Procedures The CIVP should assess the continued validity of assumptions made during certification regarding the condition and operation of critical parts in order to help ensure their continued integrity. This should include but not be limited to demonstration of the continuity of the effectiveness of design, maintenance and monitoring provisions (e.g. health monitoring, usage monitoring and safety devices) developed to comply with CS 29.547(b), CS 29.571, CS 29.573 and CS 29.917(b) through the life of the type design.

Should the applicant justify that sufficient experience already exists for some parts such that assessment within the CIVP would be of no benefit (typically due to similarity with other products, including their usage), these need not be included in the CIVP."

AH JUSTIFICATION :

No more credit from existing H/C models to justify CIVP as mentioned in the CM-S-007 Issue_01 (Post Certification Actions to Verify the Continued Integrity of Rotorcraft Critical Parts) and EASA agreed in the CRIs raised for last TCs.

AH recommends adding the possibility to take credit from existing H/C to justify CIVP.



response	<p>Noted.</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #155).</p>
comment	<p>32 comment by: AIRBUS HELICOPTERS</p> <p>About the 2nd sentence of AMC1 29.602 (a) : <i>"In addition, it may also include other parts the failure of which could have a catastrophic effect upon the rotorcraft and for which no critical characteristics have been identified at the time of certification."</i></p> <p>AH COMMENT : CS29.602(c) addresses integrity of critical parts. The definition of critical parts is given in CS 29.602(a): <i>"Critical part - A critical part is a part, the failure of which could have a catastrophic effect upon the rotorcraft, <u>and for which critical characteristics have been identified which must be controlled to ensure the required level of integrity.</u>"</i> AMC1 29.602 (a) considers as well parts which were identified with no critical characteristics: <i>"In addition, it may also include other parts the failure of which could have a catastrophic effect upon the rotorcraft and for which no critical characteristics have been identified at the time of certification."</i> AMC1 29.602 (a) is not consistent with CS 29.602(c) when addressing parts without critical characteristics. This creates a mismatch in between CS 29.571 and CS 29.573 which are dealing with PSEs (i.e., parts with catastrophic failures).</p>
response	<p>Noted.</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #154).</p>
comment	<p>34 comment by: AIRBUS HELICOPTERS</p> <p>About the 3rd sentence of AMC1 29.602 (b)(3) on page 28 : <i>"In addition, the applicant should consider scheduling early evaluation opportunities to confirm the suitability of the inspection intervals scheduled at entry into service."</i></p> <p>Airbus Helicopters suggests deleting this sentence as follows :</p> <p>AH PROPOSED DELETION : <i>"In addition, the applicant should consider scheduling early evaluation opportunities to confirm the suitability of the inspection intervals scheduled at entry into service."</i></p> <p>AH JUSTIFICATION : It is reminded that CIVP as proposed in CM-S-007 is Post Certification Actions to Verify the Continued Integrity of Rotorcraft Critical Parts. Thus, a verification after entry into service and not during the development phase. However, AH agrees that issues raised during the development can be used as inputs for the CIVP but without requiring a specific continued integrity verification programme plan (CIVPP) just for the development phase.</p>
response	<p>Noted.</p>

Not considered as per comment #159 (duplicated comment with GAMA – see comment #165).

comment 112 comment by: *Garmin International*

AMC1 29.602 (b)(5) Page 28 of 112:

This section was omitted or does not exist for AMC1 27.602. Is this in error or intentional?

response Noted.

The comment is noted for future rulemaking activities on the CIVP.
See the answer to comment 115 on point 4: 2x.602 rule changes.

comment 154 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 29.602 (a)

Justification

CS 29.602(c) addresses integrity of critical parts. The definition of critical parts is given in CS29.602 (a): [... A critical part is a part, the failure of which could have a catastrophic effect upon the rotorcraft, and for which critical characteristics have been identified ...]

AMC1 29.602 (a) considers as well parts which were identified with no critical characteristics: [...In addition, it may also include other parts the failure of which could have a catastrophic effect upon the rotorcraft and for which no critical characteristics have been identified at the time of certification. ...]

There is an inconsistency between CS29.602 (c) and AMC1 29.602 (a). This creates a mismatch in between CS 29.571 and CS 29.573 which are dealing with PSEs (i.e., parts with catastrophic failures).

Proposed resolution

EASA to correct the inconsistency.

response Noted.

The comment is noted for future rulemaking activities on the CIVP.
See the answer to comment 115 on point 4: 2x.602 rule changes.

comment 155 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 29.602 (c)

Justification

The proposed text appears to not consider credit from existing H/C models to justify CIVP as mentioned in the CM-S-007 Issue_01 - Post Certification Actions to Verify the



	<p>Continued Integrity of Rotorcraft Critical Parts and EASA agreed in the CRIs open for last TCs.</p> <p><u>Proposed resolution</u></p> <p>EASA to align the applicability of AMC1 29.602 with that recognised within the CM-S-007, specially with the possibility to take credit from experience for some critical parts. The following text is proposed:</p> <p>[... (b) Procedures</p> <p>(1) The CIVP should assess the continued validity of assumptions made during certification regarding the condition and operation of critical parts in order to help ensure their continued integrity. This should include but not be limited to demonstration of the continuity of the effectiveness of design, maintenance and monitoring provisions (e.g. health monitoring, usage monitoring and safety devices) developed to comply with CS29.571 and CS29.573 through the life of the type design.</p> <p>Should the applicant justify that sufficient experience already exists for some parts such that assessment within the CIVP would be of no benefit (typically due to similarity with other products, including their usage), these need not be included in the CIVP</p> <p>(2) The following data can be used to support the CIVP:</p> <p>...]</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>

comment	<p>161 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.602 (b)(2)</p> <p><u>Justification</u> All elements under (b)(2) may / or may not be applicable.</p> <p><u>Proposed resolution</u> EASA to revise as follows:</p> <p>“The following data can be used to support the CIVP if applicable:”</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>



comment	<p>163 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.602 (b)(3)</p> <p><u>Justification</u> The section provides a prescriptive means to execute a CIVP. Different OEMs will have different means to meet CS 29.602 (c) which should not be bound by the AMC. The Applicant is required to establish a CIVP that meets the intent of CS 29.602(c) so the prescriptive AMC in paragraph (b)(3) is redundant and too restrictive and more appropriate for GM.</p> <p><u>Proposed resolution</u> EASA to delete AMC1 27.602 (b)(3).</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>165 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.602 (b)(4)</p> <p><u>Justification</u> The paragraph (b)(3) does not fully reflect the CM-S-007 that is supposedly being transposed. The CIVP are post certification actions intended to verify the continued integrity of Rotorcraft Critical Parts. Therefore, it refers to verifications after entry into service and not during the development phase. Issues raised during the development can be used as inputs for the CIVP but there should not be a need to require a CIVPP for the development phase.</p> <p><u>Proposed resolution</u> EASA to consider removing the following sentence in AMC1 29.602 (b)(4):</p> <p>'[...in addition, the applicant should consider scheduling early evaluation opportunities to confirm the suitability of the inspection intervals scheduled at entry into service...]</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>
comment	<p>167 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.602 (b)(4)</p>

	<p><u>Justification</u> The section (b)(4) identifies the need for a plan, but there are aspects that would not be suitable for a non-EASA TC holder. Continued airworthiness is the responsibility of the State of Design and the CIVP is generated to ensure continued airworthiness / integrity.</p> <p><u>Proposed correction</u> EASA to either clarify the relationship with EASA is for EU TC holders or remove the language that talks to need to have a relationship with the Agency.</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>

comment	<p>169 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.602 (b)(4)</p> <p><u>Justification</u> The elements of a CIVP can be embedded within existing company processes and will be defined within a CIVPP. The prescriptive means in paragraph (b)(4) is too restrictive and more appropriate for GM.</p> <p><u>Proposed resolution</u> EASA to reshape AMC1 27.602 (b)(4), by only keeping the CIVPP considerations.</p>
response	<p>Noted.</p> <p>The comment is noted for future rulemaking activities on the CIVP. See the answer to comment 115 on point 4: 2x.602 rule changes.</p>

AMC1 27.923 Rotor drive system and control mechanism tests

p. 28

comment	<p>170 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>Item 7 - General Comment</p> <p>Even if agreed that AEO Hover Increased Power (HIP) is generally set to 30 minutes, the text of the NPA (all item 7 regulation requirements and AMCs) could allow any value.</p> <p>Indeed, AMC1 27.923 (b)(1) says : "In particular, AMC E40(b)(3) and (b)(4) mentions that 'The 30-Minute Power rating may be set at any level between the Maximum Continuous up to and including the take-off rating, and may be used for multiple periods of up to 30 minutes each, at any time between the take-off and landing phases in any flight'".</p>
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response	<p>Thus the term "AEO 30-minute rating" could be changed into "Extended AEO rating" or "Extended take-off power".</p> <p>Note : "30-minute" might be modified by "extended power" whenever used in CS 27/9.1049 and in any other CS and AMC paragraphs of item 7 when applicable</p> <p>Noted.</p> <p>The 30-minute power rating is used in accordance with CS-E terminology, which applies to any power rating between maximum continuous up to, and including, take-off rating that may be used for multiple periods of up to 30 minutes each.</p> <p>The use of alternative terminology may be interpreted as introducing a new rating different from this one already defined in CS-E, which is outside the scope of this regular update item.</p>
comment	<p>191 comment by: GE Aviation</p> <p>Item 7</p> <p>Comment: The AMC refers to ground test performed according to CS <u>27.923 CS 27.927</u>. Furthermore the AMC refers to CS27.1045 related to flight test Proposal consists to add the possibility to demonstrate the 30' power rating on flight test. Consequently these test will be performed joined to the cooling capability test.</p> <p>Recommendation: <u>Refer to the AMC1 27.923 b (2)</u> Add: Additional tests could be performed on flight condition at condition defined by CS27.1045 b (2)</p>
response	<p>Not accepted.</p> <p>The scope of the AMC is the endurance demonstration of the rotor drive system and control mechanism, whose scope is not similar to the cooling tests specified in CS 27.1045.</p> <p>The applicant may choose to propose a test in which both these tests are combined. However, this is not considered practical due to the need to submit the same parts to the complete endurance test, which is typically performed on a tied down rotorcraft or a ground test facility closely representing it and will not be suitable for the purpose of the CS 27.1045 test.</p>
comment	<p>215 comment by: Leonardo Helicopters</p> <p>ref. page 28 and 29 (both CS 27 and CS 29):</p> <p>the definition of how to demonstrate 30 minutes rating is necessary in the definition of the CS 2X.923 & 927. The type test cycles need to be amended.</p>
response	<p>Not accepted.</p>

As mentioned in this AMC 'The 30-minute power rating may be set at any level between the maximum continuous up to and including the take-off rating, and may be used for multiple periods of up to 30 minutes each, at any time between the take-off and landing phases in any flight.' This implies that the expected usage can be very different among products, in accordance with any specific limitations in the usage of this rating, as addressed in AMC1 27.1521. Therefore, to give applicants more flexibility, the test sequence should be proposed by the applicant depending on the intended usage of this rating of the application in question.

Therefore, the purpose of this AMC is to ensure that a CRI ESF is not systematically needed every time such rating is proposed to be approved and to specify aspects to take into consideration to ensure an acceptable test schedule for 27/29.923 is proposed by the applicant.

comment

340

comment by: TCCA-NAC

AMC1 27.923

AMC is proposed as a supplement to AC 27-1B § 27.923. In (2) Procedures, the last consideration is "and/or increasing the minimum power conditions defined in CS 27.923 ..." there is no minimum power conditions specified either in CS 27.923 nor in § AC 27.923 but there is an explanation in § 27.923A (amendment 27-23) to remove references to "engine power"

AMC is proposed as a supplement to AC 27-1B § 27.923. In (2) Procedures, the last consideration is "and/or increasing the minimum power conditions defined in CS 27.923 ..." there is no minimum power conditions specified either in CS 27.923 nor in § AC 27.923 but there is an explanation in § 27.923A (amendment 27-23) to remove references to "engine power"

response

Partially Accepted

Note: The comment text is duplicated. Nevertheless, it is understood that the proposed modification is similar to comment 341: 'EASA should consider CS 27.923(b) to include one half of the 60 minutes cycles to be run at take-off torque and speed as per powerplants limitations and the other half at the alternating 5 minutes idle and 5 minutes take-off.'

Different solutions may be proposed by applicants in accordance with the usage/limitations introduced for this rating. See also answer to comment #215.

In addition, the intent of this regular update is not to propose a single test schedule, but to highlight aspects to be considered in the definition of appropriate testing to address this rating within the CS 27.923 compliance demonstration, as in previous certification projects. This testing proposal is to be agreed with the Agency to ensure that it is consistent with the intended use of the rating in service.

To clarify its position, EASA has implemented the following modifications to AMC1 27.923: 'such rating should be supported by additional tests, as prescribed in CS



27.927(a), **to be agreed with Agency** and 'increasing the minimum ~~power~~ **torque and speed** conditions'

AMC1 29.923 Rotor drive system and control mechanism tests

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comment

192

comment by: GE Aviation

Item 7.

Comment:

The AMC refers to ground test performed according to CS 29.923 – CS 29.927.

Furthermore the AMC refers to CS29.1049 related to flight test.

Proposal consists to add the possibility to demonstrate the 30' power rating on flight test. Consequently these test will be performed joined to the cooling capability test.

Recommendation:

Refer to the AMC1 29.923 b (2)

Add:

Additional tests could be performed on flight condition at condition defined by CS 29.1049 b (2)

response

Not accepted.

See the answer to comment #191.

comment

341

comment by: TCCA-NAC

AMC1 29.923

AMC is proposed as a supplement to AC 27-1B § 27.923. In (2) Procedures, the last consideration is "and/or increasing the minimum power conditions defined in CS 27.923 ..." there is no minimum power conditions specified either in CS 27.923 nor in § AC 27.923 but there is an explanation in § 27.923A (amendment 27-23) to remove references to "engine power"

EASA should consider CS 29.923(b) to include one half of the 60 minutes cycles to be run at take-off torque and speed as per powerplants limitations and the other half at the alternating 5 minutes idle and 5 minutes take-off.

response

Partially Accepted.

See the answer to comment #340.

To clarify its position, EASA has implemented the following modifications to AMC1 27.923: 'increasing the minimum ~~power~~ **torque and speed** conditions'.

CS 27.1305 Powerplant instruments

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comment	<p>39</p> <p style="text-align: right;">comment by: AIRBUS HELICOPTERS</p> <p>Airbus Helicopters suggests replacing "30-minute power rating" by "extended power rating" in CS 27.1305 (w) as follows :</p> <p>AH PROPOSED TEXT :</p> <p>(w) For rotorcraft for which an extended power rating is claimed, [...]</p> <p>AH JUSTIFICATION :</p> <p>Refer to comment #37 about AMC1 27.1521 Powerplant limitations : Even if agreed that AEO Hover Increased Power (HIP) is generally set to 30 minutes, the text of the NPA (all item 7 regulation requirements and AMCs) could allow any value. Indeed, AMC1 27.923 (b)(1) says : "In particular, AMC E40(b)(3) and (b)(4) mentions that 'The 30-Minute Power rating may be set at any level between the Maximum Continuous up to and including the take-off rating, and may be used for multiple periods of up to 30 minutes each, at any time between the take-off and landing phases in any flight". Thus the term "AEO 30-minute rating" could be changed into "Extended AEO rating" or "Extended take-off power". Note : "30-minute" might be modified by "extended power" whenever used in any CS and AMC paragraphs of item 7 when applicable (i.e., in AMC1 27.923 ; AMC1 27.1045 ; CS 27.1305 ; AMC1 27.1521)</p>
response	<p>Noted</p> <p>Not considered as per comment #174 (duplicated comment with GAMA).</p>

comment	<p>174</p> <p style="text-align: right;">comment by: General Aviation Manufacturers Association (GAMA)</p> <p>CS 27.1305 (w)</p> <p><u>Justification</u></p> <p>Even if agreed that AEO Hover Increased Power (HIP) is generally set to 30 minutes, the text of the NPA (all item 7 regulation requirements and AMCs) could allow any value.</p> <p>Indeed, AMC1 29.923 (b)(1) says : "In particular, AMC E40(b)(3) and (b)(4) mentions that 'The 30-Minute Power rating may be set at any level between the Maximum Continuous up to and including the take-off rating, and may be used for multiple periods of up to 30 minutes each, at any time between the take-off and landing phases in any flight".</p> <p>Thus the term "AEO 30-minute rating" could be changed into "Extended AEO rating" or "Extended take-off power".</p> <p>Note : "30-minute" might be modified by "extended power" whenever used in CS 27/9.1049 and in any other CS and AMC paragraphs of item 7 when applicable.</p> <p><u>Proposed resolution</u></p> <p>Proposed text for CS 27.1305:</p>
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	(w) For rotorcraft for which an extended power rating is claimed, [...]
response	Not accepted. See the responses to comments #170 and #172.

comment	342 comment by: TCCA-NAC CS 27.1305 & CS 27.1549 PROPOSED TEXT : Replace the word "Instrument" with "indication" or "indicator" as recommended by PITT JUSTIFICATION : Along with retying of "Powerplant" as one word, the word "Instrument" should be reserved to measuring devices such as those for instrument navigation and the word "indication" or "indicator" for the display or annunciation of a condition. Note that CS 27.1337(b) is already titled "Fuel Quantity Indicator" and that CS 27.1555(c)(1) refers to "fuel quantity indicator"
response	Noted. Not subject of this NPRM. This topic will be considered in the next regular update.

comment	345 comment by: TCCA-NAC CS 27.1305 (k) PROPOSED TEXT : The referenced FAA NPRM 2017-23360 revises 27.1305(k) to display main rotor speed NR separately of the synthetised engine power display. Take care not to combine engine output shaft speed included in the dual or triple tach with turbine gas gen speed included in a synthetic power indication. JUSTIFICATION : Revise CS 27.1305(k) as per FAA NPRM to read "(k) A means to indicate the rpm of each engine and at least one tachometer, as applicable, for: ..."
response	Noted. Not subject of this NPRM. This topic will be considered in the next regular update.

CS 29.1305 Power plant Powerplant instruments	p. 31
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comment	40 comment by: AIRBUS HELICOPTERS Airbus Helicopters suggests replacing "30-minute power rating" by "extended power rating" in CS 29.1305 (a)(27) as follows :
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response	<p>AH PROPOSED TEXT : (a)(27) For rotorcraft for which an extended power rating is claimed, [...]</p> <p>AH JUSTIFICATION : Refer to comment #38 about AMC1 29.1521 Powerplant limitations : Even if agreed that AEO Hover Increased Power (HIP) is generally set to 30 minutes, the text of the NPA (all item 7 regulation requirements and AMCs) could allow any value. Indeed, AMC1 29.923 (b)(1) says : "<i>In particular, AMC E40(b)(3) and (b)(4) mentions that 'The 30-Minute Power rating may be set at any level between the Maximum Continuous up to and including the take-off rating, and may be used for multiple periods of up to 30 minutes each, at any time between the take-off and landing phases in any flight'</i>". Thus the term "AEO 30-minute rating" could be changed into "Extended AEO rating" or "Extended take-off power". Note : "<i>30-minute</i>" might be modified by "<i>extended power</i>" whenever used in any CS and AMC paragraphs of item 7 when applicable (i.e., in AMC1 29.923 ; CS 29.1049 ; CS 29.1305 ; AMC1 29.1521)</p> <p>Noted</p> <p>Not considered as per comment #175 (duplicated comment with GAMA).</p>
comment	<p>175 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 29.1305 (a)(27)</p> <p><u>Justification</u></p> <p>Even if agreed that AEO Hover Increased Power (HIP) is generally set to 30 minutes, the text of the NPA (all item 7 regulation requirements and AMCs) could allow any value.</p> <p>Indeed, AMC1 29.923 (b)(1) says : "<i>In particular, AMC E40(b)(3) and (b)(4) mentions that 'The 30-Minute Power rating may be set at any level between the Maximum Continuous up to and including the take-off rating, and may be used for multiple periods of up to 30 minutes each, at any time between the take-off and landing phases in any flight'</i>".</p> <p>Thus the term "AEO 30-minute rating" could be changed into "Extended AEO rating" or "Extended take-off power".</p> <p>Note : "<i>30-minute</i>" might be modified by "<i>extended power</i>" whenever used in CS 27/9.1049 and in any other CS and AMC paragraphs of item 7 when applicable.</p> <p><u>Proposed resolution</u></p> <p>Proposed text for CS 29.1305:</p> <p>(a)(27) For rotorcraft for which an extended power rating is claimed, [...]</p>
response	<p>Not accepted.</p> <p>See the responses to comments #170 and #173.</p>

comment	<p>343</p> <p style="text-align: right;">comment by: TCCA-NAC</p> <p>CS 29.1305 & CS 29.1549</p> <p>PROPOSED TEXT : Replace the word “Instrument” with “indication” or “indicator” as recommended by PITT</p> <p>JUSTIFICATION : Similar wording change to 29.1305 and 29.1549 from “instrument” to “indication”</p>
response	<p>Noted. Not subject of this NPRM. This topic will be considered in the next regular update.</p>

AMC1 27.1521 Powerplant limitations	p. 32
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comment	<p>35</p> <p style="text-align: right;">comment by: AIRBUS HELICOPTERS</p> <p>About the 2nd sub-bullet of AMC1 27.1521(b)(2) : "<i>cumulative limit in one flight;</i>"</p> <p>Airbus Helicopters suggests modifying in bold and underlined the bullet "<i>the associated usage limit</i>" defined in the paragraph (2) "<i>Procedure</i>" with the terms "<i>if any</i>" as follows :</p> <p>AH PROPOSED TEXT :</p> <p style="padding-left: 40px;">"- <i>the associated usage limit:</i></p> <ul style="list-style-type: none"> • <i>30 minutes in one single shot;</i> • <i>cumulative limit, <u>if any,</u> in one flight; and"</i> <p>AH JUSTIFICATION :</p> <p>The current wording of the AMC1 27.1521(b)(2) seems to indicate that there is necessarily a cumulative limit to the AEO 30-minute rating. This may not be the case as the engine manufacturer could demonstrate that this rating is not limited in number of use. Therefore it would not be necessarily required to include a cumulative limit for the helicopter powerplant. The proposed wording modification should allow this possibility.</p>
response	<p>Noted</p> <p>Not considered as per comment #176 (duplicated comment with GAMA).</p>
comment	<p>37</p> <p style="text-align: right;">comment by: AIRBUS HELICOPTERS</p> <p>About all the paragraph (b) "30-minute power rating" of AMC1 27.1521 :</p> <p>Airbus Helicopters suggests modifying this paragraph in bold and underlined as follows :</p>



AH PROPOSED TEXT :**"(b) Extended power rating****(1) Explanation**

The usage of **maximum take-off power for duration above the one prescribed by section CS 27.1521(b)(6)** supposes an extension **of this limit**.

This rating is associated with some specific limitations which should be adequately established and declared.

(2) Procedure

CS 27.1521 (a) refers to the limits for which the engine are type certificated. This should include the **Extended** power rating usage and:

- The associated limit.

o Maximum duration in one single shot;

o Cumulative limit, **if any**, in one flight; and

- Any other limits associated with the usage of the **Extended** power rating declared in the installation and/or operating manual of the engine."

AH JUSTIFICATION :

Even if agreed that AEO Hover Increased Power (HIP) is generally set to 30 minutes, the text of the NPA (all item 7 regulation requirements and AMCs) could allow any value. Indeed, AMC1 27.923 (b)(1) says : "In particular, AMC E40(b)(3) and (b)(4) mentions that 'The 30-Minute Power rating may be set at any level between the Maximum Continuous up to and including the take-off rating, and may be used for multiple periods of up to 30 minutes each, at any time between the take-off and landing phases in any flight". Thus the term "AEO 30-minute rating" could be changed into "Extended AEO rating" or "Extended take-off power". Note : "30-minute" might be modified by "extended power" whenever used in any CS and AMC paragraphs of item 7 when applicable (i.e., in AMC1 27.923 ; AMC1 27.1045 ; CS 27.1305 ; AMC1 27.1521)

response

Noted

Not considered as per comment #172 (duplicated comment with GAMA).

comment

172

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

CS 27.1521(b)(6)

Justification

Even if agreed that AEO Hover Increased Power (HIP) is generally set to 30 minutes, the text of the NPA (all item 7 regulation requirements and AMCs) could allow any value.

Indeed, AMC1 27.923 (b)(1) says : "In particular, AMC E40(b)(3) and (b)(4) mentions that 'The 30-Minute Power rating may be set at any level between the Maximum Continuous up to and including the take-off rating, and may be used for multiple periods of up to 30 minutes each, at any time between the take-off and landing phases in any flight".



Thus the term "AEO 30-minute rating" could be changed into "Extended AEO rating" or "Extended take-off power".

Note : "30-minute" might be modified by "extended power" whenever used in CS 27/9.1049 and in any other CS and AMC paragraphs of item 7 when applicable.

Proposed resolution

Proposed text for AMC1 27.1521 Powerplant limitations :

(b) Extended power rating

(1) Explanation

A

The usage of **maximum take-off power** for duration above the one prescribed by section CS 29.1521(b)(6) supposes an extension of this limit.

This rating is associated with some specific limitations which should be adequately established and declared.

(2) Procedure

CS 29.1521 (a) refers to the limits for which the engine are type certified. This should include the **Extended power** rating usage and:

- The associated limit.
 - **Maximum duration** in one single shot;
 - Cumulative limit, if any, in one flight; and
- Any other limits associated with the usage of the **Extended power** rating declared in the installation and/or operating manual of the engine.

response

Partially accepted.

AMC1 27.1521 has been modified to keep consistency with CS-E 40.

The 30-minute power rating can be used up to 30 minutes.

Changing 30-minute to extended power would require a more extensive change to CS-27 and would no more be consistent with CS-E.

comment

176

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

AMC1 27.1521

Justification

The text as proposed seems to indicate that there is a cumulative limit to the AEO 30-minute rating. This might not be the case as the engine manufacturer could



	<p>demonstrate that this rating is not limited in number of use. Therefore it would not be necessarily required to include a cumulative limit for the helicopter powerplant.</p> <p><u>Proposed resolution</u> Complement the wording in AMC1 27.1521 (b)(2) bullet 1, point 2, as follows:</p> <p>"(b) 30-minute power rating (2) Procedure ... - the associated usage limit: * 30 minutes in one single shot; * cumulative limit, if any, in one flight ; and ..."</p>
response	<p>Accepted. AMC1 27.1521 has been modified accordingly.</p>

AMC1 29.1521 Powerplant limitations

p. 32

comment	<p>36 <u>comment by: AIRBUS HELICOPTERS</u></p> <p>About the 2nd sub-bullet of AMC1 29.1521(b)(2) on page 33 : "<i>cumulative limit in one flight</i>;"</p> <p>Airbus Helicopters suggests modifying in bold and underlined the bullet "<i>the associated usage limit</i>" defined in the paragraph (2) "<i>Procedure</i>" with the terms "<i>if any</i>" as follows :</p> <p>AH PROPOSED TEXT :</p> <p style="padding-left: 40px;">"- <i>the associated usage limit</i>:</p> <ul style="list-style-type: none"> • 30 minutes in one single shot; • cumulative limit, <u>if any</u>, in one flight; and" <p>AH JUSTIFICATION :</p> <p>The current wording of the AMC1 29.1521(b)(2) seems to indicate that there is necessarily a cumulative limit to the AEO 30-minute rating. This may not be the case as the engine manufacturer could demonstrate that this rating is not limited in number of use. Therefore it would not be necessarily required to include a cumulative limit for the helicopter powerplant. The proposed wording modification should allow this possibility.</p>
response	<p>Noted</p> <p>Not considered as per comment #177 (duplicated comment with GAMA).</p>
comment	<p>38 <u>comment by: AIRBUS HELICOPTERS</u></p> <p>About all the paragraph (b) "30-minute power rating" of AMC1 29.1521 :</p>



Airbus Helicopters suggests modifying this paragraph in bold and underlined as follows :

AH PROPOSED TEXT :

"(b) Extended power rating

(1) Explanation

The usage of **maximum take-off power for duration above the one prescribed by section CS 29.1521(b)(6)** supposes an extension **of this limit.**

This rating is associated with some specific limitations which should be adequately established and declared.

(2) Procedure

CS 29.1521 (a) refers to the limits for which the engine are type certificated. This should include the **Extended** power rating usage and:

- The associated limit.

o Maximum duration in one single shot;

o Cumulative limit, **if any,** in one flight; and

- Any other limits associated with the usage of the **Extended** power rating declared in the installation and/or operating manual of the engine."

AH JUSTIFICATION :

Even if agreed that AEO Hover Increased Power (HIP) is generally set to 30 minutes, the text of the NPA (all item 7 regulation requirements and AMCs) could allow any value. Indeed, AMC1 29.923 (b)(1) says : "In particular, AMC E40(b)(3) and (b)(4) mentions that 'The 30-Minute Power rating may be set at any level between the Maximum Continuous up to and including the take-off rating, and may be used for multiple periods of up to 30 minutes each, at any time between the take-off and landing phases in any flight". Thus the term "AEO 30-minute rating" could be changed into "Extended AEO rating" or "Extended take-off power". Note : "30-minute" might be modified by "extended power" whenever used in any CS and AMC paragraphs of item 7 when applicable (i.e., in AMC1 29.923 ; CS 29.1049 ; CS 29.1305 ; AMC1 29.1521)

response

Noted

Not considered as per comment #173 (duplicated comment with GAMA).

comment

173

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

CS 29.1521(b)(6)

Justification

Even if agreed that AEO Hover Increased Power (HIP) is generally set to 30 minutes, the text of the NPA (all item 7 regulation requirements and AMCs) could allow any value.

Indeed, AMC1 29.923 (b)(1) says : "In particular, AMC E40(b)(3) and (b)(4) mentions that 'The 30-Minute Power rating may be set at any level between the Maximum Continuous up to and including the take-off rating, and may be used for multiple



periods of up to 30 minutes each, at any time between the take-off and landing phases in any flight".

Thus the term "AEO 30-minute rating" could be changed into "Extended AEO rating" or "Extended take-off power".

Note : "30-minute" might be modified by "extended power" whenever used in CS 27/9.1049 and in any other CS and AMC paragraphs of item 7 when applicable.

Proposed resolution

Proposed text for AMC1 29.1521 Powerplant limitations :

(b) Extended power rating

(1) Explanation

The usage of **maximum take-off power** for duration above the one prescribed by section CS 29.1521(b)(6) supposes an extension of this limit.

This rating is associated with some specific limitations which should be adequately established and declared.

(2) Procedure

CS 29.1521 (a) refers to the limits for which the engine are type certified. This should include the **Extended power** rating usage and:

- The associated limit.
 - **Maximum duration** in one single shot;
 - Cumulative limit, if any, in one flight; and
- Any other limits associated with the usage of the **Extended power** rating declared in the installation and/or operating manual of the engine.

response

Partially accepted.

AMC1 29.1521 has been modified to keep consistency with CS-E 40.

The 30-minute power rating can be used up to 30 minutes.

Changing 30-minute to extended power would require a more extensive change to CS-29 and would no more be consistent with CS-E.

comment

177

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

AMC1 29.1521

Justification



	<p>The text as proposed seems to indicate that there is a cumulative limit to the AEO 30-minute rating. This might not be the case as the engine manufacturer could demonstrate that this rating is not limited in number of use. Therefore it would not be necessarily required to include a cumulative limit for the helicopter powerplant.</p> <p><u>Proposed resolution</u> Complement the wording in AMC1 29.1521 (b)(2) bullet 1, point 2, as follows:</p> <p>"(b) 30-minute power rating (2) Procedure ... - the associated usage limit: * 30 minutes in one single shot; * cumulative limit, if any, in one flight ; and ..."</p>
response	<p>Accepted. AMC1 29.1521 has been modified accordingly.</p>

AMC1 27.927 Additional tests	p. 33
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comment	<p>178 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.927</p> <p><u>Justification</u> The use of multiple rotor speeds is already covered by the test requirements of 27.923. Specifically 27.923(c) and (e) are conducted at the maximum rotor speed and 27.923(d) is conducted at the minimum rotor speed. Is this not considered sufficient for evaluation of multiple rotor speeds?</p> <p><u>Proposed resolution</u> Delete AMC1 27.927 or provide more rationale for the need for tests in addition to those already prescribed in 27.923 and 27.927.</p>
response	<p>Not Accepted. CS 27/29.923 was not initially built to consider variable NR. Even if CS 27/29.923 may do thanks to existing associated requirements referring to minimum and maximum rotor speed, some aspects related to the use of variable NR which may affect the reliability of the parts may not be fully evaluated through the endurance tests prescribed in CS 27/29.923. This is in particular the case for 'covering steady states and transient conditions to be encountered in operation'. The information provided in AMC1. 27/29.927 is considered to already clarify this point.</p>

AMC1 29.927 Additional tests	p. 33
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comment	<p>179 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p>
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AMC1 29.927

Justification

The use of multiple rotor speeds is already covered by the test requirements of 29.923. Specifically 29.923(b), (c), and (d) are conducted at the maximum rotor speed and 29.923(e) and (f) are conducted at the minimum rotor speed. 29.923(h) is conducted at the max power-on overspeed expected in service and 29.923(k) is conducted at the max speed for use in OEI operation. Also 29.923(n) addresses multiple gear ratio systems. Are these requirements not considered sufficient for evaluation of multiple rotor speeds?

Proposed resolution

EASA to delete AMC1 29.927 or provide more rationale for the need for tests in addition to those already prescribed in 29.923 and 29.927.

response

Not Accepted.

See the answer to comment #178.

AMC1 27.1529 Instructions for continued airworthiness

p. 34

comment

41

comment by: AIRBUS HELICOPTERS

About the 2nd paragraph of AMC1 27.1529 (b) :

Airbus Helicopters suggests removing "*severe turbulence encounters*" from this paragraph as follows :

AH PROPOSED TEXT :

"Abnormal events that should be considered include hard landings, ~~severe turbulence encounters~~, lightning strike, exposure to high winds when parked and dropping components during maintenance or transport."

AH JUSTIFICATION :

The notion of turbulence does not exist in the rotorcraft regulations and therefore neither does severe turbulence. Equivalent 25.341 criteria are flight turbulences impacting structure and are not applicable to H/C. Therefore, it is suggested that the text be modified to meet rotorcraft conditions.

response

Noted

Not considered as per comment #159 (duplicated comment with GAMA).

comment

43

comment by: AIRBUS HELICOPTERS

About the 1st and 2nd paragraph of AMC1 27.1529 (b) : *"The ICA should include instructions that ensure that operators conduct appropriate inspections or other actions following abnormal events in operation, maintenance or during transportation of components. Abnormal events that should be considered include [...] dropping components during maintenance or transport."*



response	<p>AH COMMENT : Aibus Helicopters suggests a dedicated RMT for addressing the dropping components during maintenance as out of the scope of a regular update.</p> <p>Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA).</p>
comment	<p>45 comment by: AIRBUS HELICOPTERS</p> <p>About the 1st and 2nd paragraph of AMC1 27.1529 (b) : <i>"The ICA should include instructions that ensure that operators conduct appropriate inspections or other actions following abnormal events in operation, maintenance or during <u>transportation of components</u>. Abnormal events that should be considered include [...] dropping components during maintenance or <u>transport</u>."</i></p> <p>Airbus Helicopters suggests, as a minimum, to separate transportation from the rest of the abnormal events as follows :</p> <p>AH PROPOSED TEXT : <i>"(b)(1) Abnormal events The ICA should include instructions that ensure that operators conduct appropriate inspections or other actions following abnormal events in operation or maintenance of components. Abnormal events that should be considered include hard landings, lightning strike, exposure to high winds when parked and dropping components during maintenance. The instructions should consider the nature of the components, including but not limited to critical parts, and in particular the possibility of damage that can occur during impact or overload events that may not be detectable but could subsequently lead to premature failure in operation. In such cases, scrapping the component or parts of it may be the only appropriate action to take.</i></p> <p><i>(b)(2) Packaging and transport The ICA should include instruction to condition components for transport and post transport inspection of components allowing assessment of abnormal transport events. The instructions should consider the nature of the components, including but not limited to critical parts, and in particular the possibility of damage that can occur during transport and the impact on the airworthiness of the aircraft. ATA 300 should be used as guidance for the definition of a normal transport environment."</i></p> <p>AH COMMENT : AH suggests a dedicated RMT for addressing the transportation aspects as out of the scope of a regular update. The formulation of the AMC states that inspections should be defined to ensure airworthiness after an abnormal transport event. The intent is fully understood but this formulation suggests two things:</p> <ul style="list-style-type: none"> • That there is clear definition of what an abnormal transport is. If military standards exist fully defining a transport environment, in the civil aviation

	<p>world, apart from ATA 300 giving some elements, the literature is unfortunately not clear / there is no clear state of the art.</p> <ul style="list-style-type: none"> • That there is a means to detect an abnormal transport event. The means to detect such events can take one or more forms: <ul style="list-style-type: none"> ○ A full part 145 / part M oversight of the transport. Realistically, this is hardly possible when considering all modes of transport and such an obligation would need to be reflected in the part M or part 145 regulations. ○ A report of the transporter. This is hardly realistic as well considering the number and “reliability” of partners involved in the logistics world. Furthermore, legally speaking, transferring a part M or part 145 responsibility in the logistics legal framework promises to be more than challenging! Again, this process would need to be reflected in the part M / part 145 regulation. ○ The use of sensoric to monitor the transport which poses the question of reliability of such equipment. Ensuring airworthiness using such components would require qualifying it to a “DAL-A equivalent” (ED-12C/DO-178C). <p>All of this is of course feasible but should be assessed more deeply with all partners in the initial and continuing airworthiness world in terms of cost, benefit and risk. The more realistic / simpler alternative is to request that ICA include clear instruction to condition components for transport and to have clear post transport inspections to be able to assess that no abnormal transport event has occurred. Without sending the equipment back to OEM for a full ATP, such inspections can unfortunately never exclude hidden failures but, as clear packaging instructions and clear post transport inspections already go a long way to improve safety, hidden failures should be considered a an acceptable remaining risk as the associated probability is very low.</p>
response	<p>Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA).</p>

comment	<p>47 comment by: AIRBUS HELICOPTERS</p> <p>About the last paragraph of AMC1 27.1529 (c)(2) on page 37 (before the Note 1) : <i>"Finally, if a major change is introduced to or affecting a drive system gearbox, the applicant should evaluate the need to revise the TBO and incorporate additional steps in the gearbox TBO maturity plan."</i></p> <p>AH COMMENT :</p> <p>Airbus Helicopters suggests a clarification of the relationships between the classification of major change (21.A.91) and the need to revise the TBO. Indeed, it is not usual to make such links with the classification of a change. Clarify what the exact criteria are, in order to revise the TBO which could be not linked to the classification of the change.</p>
response	<p>Noted</p>



Not considered as per comment #159 (duplicated comment with GAMA – see comment #188).

comment 180 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 27.1529 (b)

Justification

With respect to this paragraph:

[(b) Abnormal events

The ICA should include instructions that ensure that operators conduct appropriate inspections or other actions following abnormal events in operation, maintenance or during transportation of components.

... and *dropping components during maintenance or transport.*]

GAMA suggests a dedicated RMT for addressing the dropping components during maintenance as it is out of the scope of a regular update.

Proposed resolution

EASA to consider a dedicated RMT for the topic on dropping components during maintenance.

response Not accepted.

It is well understood that certain abnormal events can lead to damage to the aircraft or its components that may not be obvious or detected by subsequent checks that may be performed at the operator's initiative following the event. Hence, more detailed requirements or instructions should be provided by the design approval holders.

comment 182 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 27.1529 (b)

Justification

The formulation of the AMC states that inspections should be defined to ensure airworthiness after an abnormal transport event. The intent is fully understood but this formulation suggests two things:

- That there is clear definition of what an abnormal transport is. If military standards exist fully defining a transport environment, in the civil aviation world, apart from ATA 300 giving some elements, the literature is unfortunately not clear / there is no clear state of the art.
- That there is a means to detect an abnormal transport event. The means to detect such events can take one or more forms:
 - A full part 145 / part M oversight of the transport. Realistically, this is hardly possible when considering all modes of transport and such an



obligation would need to be reflected in the part M or part 145 regulations.

- A report of the transporter. This is hardly realistic as well considering the number and “reliability” of partners involved in the logistics world. Furthermore, legally speaking, transferring a part M or part 145 responsibility in the logistics legal framework promises to be more than challenging! Again, this process would need to be reflected in the part M / part 145 regulation.
- The use of sensoric to monitor the transport which poses the question of reliability of such equipment. Ensuring airworthiness using such components would require qualifying it to a “DAL-A equivalent” (ED-12C et DO-178C).

All of this is of course feasible but should be assessed more deeply with all partners in the initial and continuing airworthiness world in terms of cost, benefit and risk. The more realistic / simpler alternative is to request that ICA include clear instruction to condition components for transport and to have clear post transport inspections to be able to assess that no abnormal transport event has occurred. Without sending the equipment back to OEM for a full ATP, such inspections can unfortunately never exclude hidden failures but, as clear packaging instructions and clear post transport inspections already go a long way to improve safety, hidden failures should be considered a an acceptable remaining risk as the associated probability is very low.

Proposed resolution

As a minimum GAMA suggests to separate transportation from the rest of the abnormal events in AMC1 27.1529 (b), and include an additional paragraph as proposed:

(b)(1) Abnormal events

The ICA should include instructions that ensure that operators conduct appropriate inspections or other actions following abnormal events in operation or maintenance of components. Abnormal events that should be considered include hard landings, lightning strike, exposure to high winds when parked and dropping components during maintenance.

The instructions should consider the nature of the components, including but not limited to critical parts, and in particular the possibility of damage that can occur during impact or overload events that may not be detectable but could subsequently lead to premature failure in operation. In such cases, scrapping the component or parts of it may be the only appropriate action to take.

(b)(2) Packaging and transport

The ICA should include instruction to condition components for transport and post transport inspection of components allowing assessment of abnormal transport events. The instructions should consider the nature of the components, including but not limited to critical parts, and in particular the possibility of damage that can occur during transport and the impact on the airworthiness of the aircraft. ATA 300 should be used as guidance for the definition of a normal transport environment.

response Not accepted.



We see no reason to split the requirement and provide dedicated guidance for packaging and transport.
 However, we recognise the need for a TCH to include in the ICA dedicated instructions in order to protect their parts during these phases, without the need for EASA to be too prescriptive in that respect.
 If industry considers that further guidance may be necessary, EASA will consider such requests for inclusion in the rulemaking programme.

comment 184 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 27.1529 (b)

Justification

The notion of turbulence doesn't exist within the regulatory framework applicable to rotorcraft. In consequence, the concept of severe turbulence should not exist either. Equivalent criteria of 'flight turbulences impacting structure' described in CS 25.341 is not applicable to H/C. Text to be modified to meet rotorcraft conditions.

Proposed resolution

It is suggested to change the sentence as follows:

"abnormal events that should be considered include hard landings, ~~severe turbulence encounters~~, lightning strike, exposure to high winds when parked and dropping components during maintenance or transport."

response Not accepted.

We recognise that the rotorcraft community may be more familiar with the concept of gust as used in CS 27.341 rather than turbulence. 'Severe turbulence' will be replaced with 'severe gust'. It is up to the TCH to consider if these types of events should lead to actions being taken for their products.

comment 186 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 27.1529 (c)(1)

Justification

The following sentence makes assumptions about "critical parts" in the design of gearboxes which may not be applicable to all designs and as we know, critical parts must meet the criteria of CS 27.602:

"A rotorcraft rotor drive system gearbox is usually a complex assembly composed of many parts of which a significant proportion are critical parts."

Proposed resolution

EASA to reword the sentence as proposed:

"A rotorcraft rotor drive system gearbox is usually a complex assembly composed of many parts of which a significant proportion **can be** critical parts."



response Accepted.
It is true that some gearboxes such as accessory gear boxes (AGBs) are usually not composed of a significant proportion of critical parts.
AMC1.27/29.1529 has been reworded as proposed in the comment: 'A rotorcraft rotor drive system gearbox is usually a complex assembly composed of many parts of which a significant proportion **can be** critical parts.'

comment 188 comment by: *General Aviation Manufacturers Association (GAMA)*
AMC1 27.1529 (c)(2)

Justification

With respect to the following paragraph:

"Finally, if a major change is introduced to or affecting a drive system gearbox, the applicant should evaluate the need to revise the TBO and incorporate additional steps in the gearbox TBO maturity plan."

It seems to be ambiguous in defining the relationships between the classification of a major change (21.A.91) and the need to revise the TBO. Indeed, it is not usual to make such links with the classification of a change.

Proposed resolution

EASA to clarify which should be the exact criteria used to revise the TBO as it could not be linked to the classification of a change.

response Not accepted
The re-evaluation of the TBO, for compliance demonstration with CS 27.1529, should be considered as any other requirement that may be affected by a design change. Design changes whose impact would require the reliability of gearbox components to be re-evaluated in service to confirm the adequacy of TBO interval should lead to an evaluation on the need to modify or implement a TBO development plan.

comment 210 comment by: *European Helicopter Association*

Item 9: ICAs: The change introduces additional steps for increasing the TBO of drive system components. This will include increased effort from operators and maintainers and likely introduce delays in increases to TBO intervals which will increase cost and burden to the operating community. The hidden cost and burden for operators needs to be properly evaluated.

response Noted
This proposed AMC only provides guidance on how to define a TBO development plan. This plan is simply the definition and formalisation of the strategy to verify that reliability is in line with assumptions made at the time of certification supporting extension of the interval. This is not a new process and it is understood that TCHs have been already doing so following their own procedures. In any case, this AMC is not introducing any new requirements or the need for additional activities; it will simply ensure that a minimum sample set and criteria are evaluated to confirm interval



extensions are adequately justified. Therefore, this AMC should not result in additional costs and/or burden to the operator community.

comment	<p>335 comment by: <i>Leonardo Helicopters</i></p> <p>ref. AMC1 27.1529 (c):</p> <p>The TBO purpose is to verify the degradation; the purpose of the structural/fatigue test is to define if “crack” is generated/propagate on a component. The TBO interval is not defined based on fatigue results. The TBO is not defined to verify the development of crack (even if NDT inspection has the purpose to define if crack is enucleated).</p> <p>In this section, different maturity steps are considered for TBO: we suggest to add the option of other alternative methods, e.g. adding “[...] or any other method accepted by Agency”.</p>
response	<p>Not accepted.</p> <p>It is agreed that a TBO ‘is not defined based on fatigue results’ and ‘is not defined to verify the development of crack’. The purpose of the AMC is to ensure that the overhaul intervals in place are appropriately supported by adequate levels of reliability based on service experience.</p> <p>As for all AMC, any other means of compliance may be proposed by the applicant and accepted by Agency. Therefore, as this is already clear, EASA will not add this proposed change to AMC1 27.1529.</p>

AMC1 29.1529 Instructions for continued airworthiness

p. 37

comment	<p>42 comment by: <i>AIRBUS HELICOPTERS</i></p> <p>About the 2nd paragraph of AMC1 29.1529 (b) :</p> <p>Airbus Helicopters suggests removing "<i>severe turbulence encounters</i>" from this paragraph as follows :</p> <p>AH PROPOSED TEXT :</p> <p><i>"Abnormal events that should be considered include hard landings, severe turbulence encounters, lightning strike, exposure to high winds when parked and dropping components during maintenance or transport."</i></p> <p>AH JUSTIFICATION :</p> <p>The notion of turbulence does not exist in the rotorcraft regulations and therefore neither does severe turbulence. Equivalent 25.341 criteria are flight turbulences impacting structure and are not applicable to H/C. Therefore, it is suggested that the text be modified to meet rotorcraft conditions.</p>
response	<p>Noted</p>



Not considered as per comment #159 (duplicated comment with GAMA).

comment

44

comment by: AIRBUS HELICOPTERS

About the 1st and 2nd paragraph of AMC1 29.1529 (b) : *"The ICA should include instructions that ensure that operators conduct appropriate inspections or other actions following abnormal events in operation, maintenance or during transportation of components. Abnormal events that should be considered include [...] dropping components during maintenance or transport."*

AH COMMENT :

Aibus Helicopters suggests a dedicated RMT for addressing the **dropping components** during maintenance as out of the scope of a regular update.

response

Noted

Not considered as per comment #159 (duplicated comment with GAMA).

comment

46

comment by: AIRBUS HELICOPTERS

About the 1st and 2nd paragraph of AMC1 29.1529 (b) : *"The ICA should include instructions that ensure that operators conduct appropriate inspections or other actions following abnormal events in operation, maintenance or during transportation of components. Abnormal events that should be considered include [...] dropping components during maintenance or transport."*

Airbus Helicopters suggests, as a minimum, to separate transportation from the rest of the abnormal events as follows :

AH PROPOSED TEXT :*"(b)(1) Abnormal events*

The ICA should include instructions that ensure that operators conduct appropriate inspections or other actions following abnormal events in operation or maintenance of components. Abnormal events that should be considered include hard landings, lightning strike, exposure to high winds when parked and dropping components during maintenance. The instructions should consider the nature of the components, including but not limited to critical parts, and in particular the possibility of damage that can occur during impact or overload events that may not be detectable but could subsequently lead to premature failure in operation. In such cases, scrapping the component or parts of it may be the only appropriate action to take.

(b)(2) Packaging and transport

The ICA should include instruction to condition components for transport and post transport inspection of components allowing assessment of abnormal transport events. The instructions should consider the nature of the components, including but not limited to critical parts, and in particular the possibility of damage that can occur during transport and the impact on the airworthiness of the aircraft. ATA 300 should be used as guidance for the definition of a normal transport environment."



AH COMMENT :

AH suggests a dedicated RMT for addressing the **transportation aspects** as out of the scope of a regular update. The formulation of the AMC states that inspections should be defined to ensure airworthiness after an abnormal transport event. The intent is fully understood but this formulation suggests two things:

- That there is clear definition of what an abnormal transport is. If military standards exist fully defining a transport environment, in the civil aviation world, apart from ATA 300 giving some elements, the literature is unfortunately not clear / there is no clear state of the art.
- That there is a means to detect an abnormal transport event. The means to detect such events can take one or more forms:
 - A full part 145 / part M oversight of the transport. Realistically, this is hardly possible when considering all modes of transport and such an obligation would need to be reflected in the part M or part 145 regulations.
 - A report of the transporter. This is hardly realistic as well considering the number and “reliability” of partners involved in the logistics world. Furthermore, legally speaking, transferring a part M or part 145 responsibility in the logistics legal framework promises to be more than challenging! Again, this process would need to be reflected in the part M / part 145 regulation.
 - The use of sensoric to monitor the transport which poses the question of reliability of such equipment. Ensuring airworthiness using such components would require qualifying it to a “DAL-A equivalent” (ED-12C/DO-178C).

All of this is of course feasible but should be assessed more deeply with all partners in the initial and continuing airworthiness world in terms of cost, benefit and risk. The more realistic / simpler alternative is to request that ICA include clear instruction to condition components for transport and to have clear post transport inspections to be able to assess that no abnormal transport event has occurred. Without sending the equipment back to OEM for a full ATP, such inspections can unfortunately never exclude hidden failures but, as clear packaging instructions and clear post transport inspections already go a long way to improve safety, hidden failures should be considered as an acceptable remaining risk as the associated probability is very low.

response

Noted

Not considered as per comment #159 (duplicated comment with GAMA).

Comment

48

comment by: AIRBUS HELICOPTERS

About the last paragraph of AMC1 29.1529 ©(2) on page 40 (before the Note 1)“: *"Finally, if a major change is introduced to or affecting a drive system gearbox, the applicant should evaluate the need to revise the TBO and incorporate additional steps in the gearbox TBO maturity pl"n."*

AH COMMENT :



response	<p>Airbus Helicopters suggests a clarification of the relationships between the classification of major change (21.A.91) and the need to revise the TBO. Indeed, it is not usual to make such links with the classification of a change. Clarify what the exact criteria are, in order to revise the TBO which could be not linked to the classification of the change.</p> <p>Noted</p> <p>Not considered as per comment #159 (duplicated comment with GAMA – see comment #189).</p>
comment	<p>181 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1529 (b)</p> <p><u>Justification</u></p> <p>With respect to this paragraph: [(b) Abnormal events The ICA should include instructions that ensure that operators conduct appropriate inspections or other actions following abnormal events in operation, maintenance or during transportation of components. ... and <i>dropping components during maintenance or transport.</i>]</p> <p>GAMA suggests a dedicated RMT for addressing the dropping components during maintenance as it is out of the scope of a regular update.</p> <p><u>Proposed resolution</u></p> <p>EASA to consider a dedicated RMT for the topic on dropping components during maintenance.</p>
response	<p>Not accepted.</p> <p>It is well understood that certain abnormal events can lead to damage to the aircraft or its components that may not be obvious or detected by subsequent checks that may be performed at the operator’s initiative following the event. Hence, more detailed requirements or instructions should be provided by the design approval holders.</p>
comment	<p>183 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1529 (b)</p> <p><u>Justification</u></p> <p>The formulation of the AMC states that inspections should be defined to ensure airworthiness after an abnormal transport event. The intent is fully understood but this formulation suggests two things:</p>

- That there is clear definition of what an abnormal transport is. If military standards exist fully defining a transport environment, in the civil aviation world, apart from ATA 300 giving some elements, the literature is unfortunately not clear / there is no clear state of the art.
- That there is a means to detect an abnormal transport event. The means to detect such events can take one or more forms:
 - A full part 145 / part M oversight of the transport. Realistically, this is hardly possible when considering all modes of transport and such an obligation would need to be reflected in the part M or part 145 regulations.
 - A report of the transporter. This is hardly realistic as well considering the number and “reliability” of partners involved in the logistics world. Furthermore, legally speaking, transferring a part M or part 145 responsibility in the logistics legal framework promises to be more than challenging! Again, this process would need to be reflected in the part M / part 145 regulation.
 - The use of sensoric to monitor the transport which poses the question of reliability of such equipment. Ensuring airworthiness using such components would require qualifying it to a “DAL-A equivalent” (ED-12C et DO-178C).

All of this is of course feasible but should be assessed more deeply with all partners in the initial and continuing airworthiness world in terms of cost, benefit and risk. The more realistic / simpler alternative is to request that ICA include clear instruction to condition components for transport and to have clear post transport inspections to be able to assess that no abnormal transport event has occurred. Without sending the equipment back to OEM for a full ATP, such inspections can unfortunately never exclude hidden failures but, as clear packaging instructions and clear post transport inspections already go a long way to improve safety, hidden failures should be considered a an acceptable remaining risk as the associated probability is very low.

Proposed resolution

As a minimum GAMA suggests to separate transportation from the rest of the abnormal events in AMC1 29.1529 (b)
, and include an additional paragraph as proposed:

(b)(1) Abnormal events

The ICA should include instructions that ensure that operators conduct appropriate inspections or other actions following abnormal events in operation or maintenance of components. Abnormal events that should be considered include hard landings, lightning strike, exposure to high winds when parked and dropping components during maintenance.

The instructions should consider the nature of the components, including but not limited to critical parts, and in particular the possibility of damage that can occur during impact or overload events that may not be detectable but could subsequently lead to premature failure in operation. In such cases, scrapping the component or parts of it may be the only appropriate action to take.



(b)(2) Packaging and transport

The ICA should include instruction to condition components for transport and post transport inspection of components allowing assessment of abnormal transport events. The instructions should consider the nature of the components, including but not limited to critical parts, and in particular the possibility of damage that can occur during transport and the impact on the airworthiness of the aircraft. ATA 300 should be used as guidance for the definition of a normal transport environment.

response

Not accepted.

We see no reason to split the requirement and provide dedicated guidance for packaging and transport.

However, we recognise the need for a TCH to include in the ICA dedicated instructions in order to protect their parts during these phases, without the need for EASA to be too prescriptive in that respect.

If industry considers that further guidance may be necessary, EASA will consider such requests for inclusion in the rulemaking programme.

comment

185

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

AMC1 29.1529 (b)

Justification

The notion of turbulence doesn't exist within the regulatory framework applicable to rotorcraft. In consequence, the concept of severe turbulence should not exist either. Equivalent criteria of 'flight turbulences impacting structure' described in CS 25.341 is not applicable to H/C. Text to be modified to meet rotorcraft conditions.

Proposed resolution

It is suggested to change the sentence as follows:

"abnormal events that should be considered include hard landings, ~~severe turbulence encounters~~, lightning strike, exposure to high winds when parked and dropping components during maintenance or transport."

response

Not accepted.

We recognise that the rotorcraft community may be more familiar with the concept of gust as used in CS 29.341 rather than turbulence. 'Severe turbulence' will be replaced with 'severe gust'. It is up to the TCH to consider if these types of events should lead to actions being taken for their products.

comment

187

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

AMC1 29.1529 (c)(1)

Justification

The following sentence makes assumptions about "critical parts" in the design of gearboxes which may not be applicable to all designs and as we know, critical parts must meet the criteria of CS 29.602:



	<p>“A rotorcraft rotor drive system gearbox is usually a complex assembly composed of many parts of which a significant proportion are critical parts.”</p> <p><u>Proposed resolution</u> EASA to reword the sentence as proposed:</p> <p>“A rotorcraft rotor drive system gearbox is usually a complex assembly composed of many parts of which a significant proportion can be critical parts.”</p>
response	<p>Accepted</p> <p>See the answer to comment #186.</p>

comment	<p>189 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1529 (c)(2)</p> <p><u>Justification</u> With respect to the following paragraph: <i>"Finally, if a major change is introduced to or affecting a drive system gearbox, the applicant should evaluate the need to revise the TBO and incorporate additional steps in the gearbox TBO maturity plan."</i></p> <p>It seems to be ambiguous in defining the relationships between the classification of a major change (21.A.91) and the need to revise the TBO. Indeed, it is not usual to make such links with the classification of a change.</p> <p><u>Proposed resolution</u> EASA to clarify which should be the exact criteria used to revise the TBO as it could not be linked to the classification of a change.</p>
response	<p>Not accepted</p> <p>See the answer to comment #188.</p>

CS 27.1555 Control markings

p. 40

comment	<p>49 comment by: <i>AIRBUS HELICOPTERS</i></p> <p>About the sentence in CS 27.1555 (c)(1) : "<i>[...] the usable fuel capacity of the system must be indicated at the fuel quantity indicator [...]</i>"</p> <p>AH COMMENT : The meaning of usable fuel capacity should be clarified : maximum tank capacity or remaining fuel ?</p> <p>AH JUSTIFICATION : Airbus Helicopters reminds that the actual remaining fuel is displayed to the flight crew on the VMS (Vehicule Management System) and the usable fuel capacity (the maximum tank capacity) is provided in the flight manual.</p>
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response	Noted Not considered as per comment #199 (duplicated comment with GAMA).
comment	<p>50 comment by: AIRBUS HELICOPTERS</p> <p>About the sentence in CS 27.1555 (c)(2) : "[...] the usable fuel capacity available at each selector control position must be indicated near the selector control."</p> <p>AH COMMENT : The meaning of usable fuel capacity should be clarified : maximum tank capacity or remaining fuel ?</p> <p>AH JUSTIFICATION : Airbus Helicopters reminds that the actual remaining fuel is displayed to the flight crew on the VMS (Vehicule Management System) and the usable fuel capacity (the maximum tank capacity) is provided in the flight manual.</p>
response	Noted Not considered as per comment #199 (duplicated comment with GAMA).
comment	<p>195 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>CS 27.1555(c)(1) CS 27.1555(c)(2)</p> <p><u>Justification</u> If the intent of the revision is to be less prescriptive, there are still prescriptive elements in the revised text that can be revised and the AMC can provide the acceptable means to comply.</p> <p><u>Proposed resolution</u> The text could be written as follows:</p> <p>"For fuel systems having no selector controls, there must be a means to provide the useable fuel capacity to the pilot."</p>
response	Not accepted. At least the localisation of the so-called means needs to be specified. In addition, it is not aligned with the intention of the rule as it does not cover both independent means: indication and RFM.
comment	<p>197 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>CS 27.1555(c)(1) CS 27.1555(c)(2)</p> <p><u>Justification</u> In consideration of modern cockpit designs, where the term "near" is impractical, the proposed change to 27.1555(c)(1) could be extended to 27.1555(c)(2).</p>



	<p><u>Proposed resolution</u> Suggest changing 27.1555(c)(2) as follows:</p> <p>“For fuel systems having selector controls, the usable fuel capacity available at each selector control position must be indicated near the selector control, unless it is:</p> <p>(i) Provided by another system or equipment readily accessible to the pilot; and</p> <p>(ii) Contained in the limitations section of the rotorcraft flight manual.”</p>
response	<p>Not accepted, as it does not cover the design requirement that the indication should be placed <u>near</u> each selector. As the modification of this sub-paragraph was not part of the initial NPA and EASA is not aware of any related project, this issue has not been addressed in the related Decision.</p>

comment	<p>199 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 27.1555 (c)(2)</p> <p><u>Justification</u> With respect to the sentence : "the usable fuel capacity of the system must be indicated at the fuel quantity indicator." GAMA reminds that the actual remaining fuel is displayed to the flight crew on the VMS and the usable fuel capacity (the maximum tank capacity) is provided in the flight manual.</p> <p><u>Proposed resolution</u> EASA should clarify the meaning of usable fuel capacity : maximum tank capacity or remaining fuel?</p>
response	<p>Accepted. AMC 27.1555 has been added to provide a definition of ‘usable fuel capacity’.</p>

CS 29.1555 Control marking

p. 41

comment	<p>51 comment by: <i>AIRBUS HELICOPTERS</i></p> <p>About the sentence in CS 29.1555 (c)(1) : "[...] the usable fuel capacity of the system must be indicated at the fuel quantity indicator [...]"</p> <p><u>AH COMMENT :</u> The meaning of usable fuel capacity should be clarified : maximum tank capacity or remaining fuel ?</p> <p><u>AH JUSTIFICATION :</u></p>
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response	<p>Airbus Helicopters reminds that the actual remaining fuel is displayed to the flight crew on the VMS (Vehicule Management System) and the usable fuel capacity (the maximum tank capacity) is provided in the flight manual.</p> <p>Noted</p> <p>Not considered as per comment #200 (duplicated comment with GAMA).</p>
comment	<p>52 comment by: AIRBUS HELICOPTERS</p> <p>About the sentence in CS 29.1555 (c)(2) : "[...] the usable fuel capacity available at each selector control position must be indicated near the selector control."</p> <p>AH COMMENT : The meaning of usable fuel capacity should be clarified : maximum tank capacity or remaining fuel ?</p> <p>AH JUSTIFICATION : Airbus Helicopters reminds that the actual remaining fuel is displayed to the flight crew on the VMS (Vehicule Management System) and the usable fuel capacity (the maximum tank capacity) is provided in the flight manual.</p>
response	<p>Noted</p> <p>Not considered as per comment #200 (duplicated comment with GAMA).</p>
comment	<p>196 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>CS 29.1555(c)(1) CS 29.1555(c)(2)</p> <p><u>Justification</u> If the intent of the revision is to be less prescriptive, there are still prescriptive elements in the revised text that can be revised and the AMC can provide the acceptable means to comply.</p> <p><u>Proposed resolution</u> The text could be written as follows: "For fuel systems having no selector controls, there must be a means to provide the useable fuel capacity to the pilot."</p>
response	<p>Not accepted.</p> <p>At least the localisation of the so-called means needs to be specified. In addition, it is not aligned with the intention of the rule as it is does not cover both independent means: indication and RFM.</p>
comment	<p>198 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>CS 29.1555(c)(1) CS 29.1555(c)(2)</p>



	<p><u>Justification</u> In consideration of modern cockpit designs, where the term “near” is impractical, the proposed change to 29.1555(c)(1) could be extended to 29.1555(c)(2).</p> <p><u>Proposed resolution</u> Suggest changing 29.1555(c)(2) as follows:</p> <p>“For fuel systems having selector controls, the usable fuel capacity available at each selector control position must be indicated near the selector control, unless it is:</p> <p>(i) Provided by another system or equipment readily accessible to the pilot; and</p> <p>(ii) Contained in the limitations section of the rotorcraft flight manual.”</p>
response	<p>Not accepted, as it does not cover the design requirement that the indication should be placed <u>near</u> each selector. As the modification of this paragraph was not part of the initial NPA and EASA is not aware of any related project, this issue has not been addressed in the related Decision.</p>

comment	<p>200 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 29.1555 (c)(2)</p> <p><u>Justification</u> With respect to the sentence : "the usable fuel capacity of the system must be indicated at the fuel quantity indicator." GAMA reminds that the actual remaining fuel is displayed to the flight crew on the VMS and the usable fuel capacity (the maximum tank capacity) is provided in the flight manual.</p> <p><u>Proposed resolution</u> EASA should clarify the meaning of usable fuel capacity : maximum tank capacity or remaining fuel?</p>
response	<p>Accepted. AMC2 29.1555 has been added to provide a definition of “usable fuel capacity”.</p>

CS 27.1549 Powerplant instruments	p. 41
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comment	<p>53 comment by: <i>AIRBUS HELICOPTERS</i></p> <p>About the sentence of CS 27.1549 (b) : "Each normal operating range must be marked as a green or unmarked range"</p> <p>Airbus Helicopters suggests the following wording : AH PROPOSED TEXT :</p>
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	<p>"(b) Each normal operating range must be depicted as a green or unmarked range;"</p> <p>AH JUSTIFICATION : The wording "Marked" / "Unmarked" in the same sentence could be misinterpreted/conflicting and AH suggests reformulating this sentence</p>
response	<p>Noted</p> <p>Not considered as per comment #201 (duplicated comment with GAMA).</p>
comment	<p>201 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 27.1549</p> <p><u>Justification</u> The use of marked/unmarked as presented in the same sentence might to lead to misinterpretation or ambiguous/conflicting conclusions.</p> <p><u>Proposed resolution</u> EASA to consider an alternative wording proposal:</p> <p>"Each normal operating range must be depicted as a green or unmarked range"</p>
response	<p>Accepted.</p>
comment	<p>203 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 27.1549(d)</p> <p><u>Justification</u> Word "propeller" is incorrect and was originally added to 14CFR Part 27 based on Part 25 language.</p> <p><u>Proposed resolution</u> Word "propeller" should be changed to "rotor".</p>
response	<p>Not accepted. Though it is not a common design, some rotorcraft may be designed with propellers.</p>
comment	<p>364 comment by: <i>Pietro Piliero</i></p> <p>CS 27/29.1549</p> <p>Item 11 should also include CS 27.1545 and CS 29.1545 to fulfil the intent of the NPA because as written it addresses only powerplant instruments and not airspeed indicator</p>
response	<p>Accepted.</p> <p>CS 27.1545 and CS 29.1545 have be modified accordingly.</p>



CS 29.1549 Powerplant instruments

p. 42

comment	54	comment by: AIRBUS HELICOPTERS
	<p>About the sentence of CS 29.1549 (b) : "Each normal operating range must be marked as a green or unmarked range"</p> <p>Airbus Helicopters suggests the following wording :</p> <p>AH PROPOSED TEXT :</p> <p>"(b) Each normal operating range must be depicted as a green or unmarked range;"</p> <p>AH JUSTIFICATION :</p> <p>The wording "Marked" / "Unmarked" in the same sentence could be misinterpreted/conflicting and AH suggests reformulating this sentence</p>	
response	<p>Noted</p> <p>Not considered as per comment #202 (duplicated comment with GAMA).</p>	
comment	202	comment by: General Aviation Manufacturers Association (GAMA)
	<p>CS 29.1549</p> <p><u>Justification</u></p> <p>The use of marked/unmarked as presented in the same sentence might lead to misinterpretation or ambiguous/conflicting conclusions.</p> <p><u>Proposed resolution</u></p> <p>EASA to consider an alternative wording proposal:</p> <p>"Each normal operating range must be depicted as a green or unmarked range"</p>	
response	<p>Accepted.</p>	
comment	204	comment by: General Aviation Manufacturers Association (GAMA)
	<p>CS 29.1549(d)</p> <p><u>Justification</u></p> <p>Word "propeller" is incorrect and was originally added to 14CFR Part 27 based on Part 25 language.</p> <p><u>Proposed resolution</u></p> <p>Word "propeller" should be changed to "rotor".</p>	
response	<p>Not accepted.</p> <p>Though it is not a common design, some rotorcraft may be designed with propellers.</p>	



AMC1 27.965 Fuel tank tests

p. 43

comment

55

comment by: AIRBUS HELICOPTERS

About AMC1 27.965 (b) Use of MIL-T-6396

AH COMMENT :

Airbus Helicopters agrees with the proposed text

AH JUSTIFICATION :

In this proposed AMC, EASA provides clarification regarding the appropriate use of MIL-DTL-6396, for those applicants who so wish. AH carries out the slosh and vibration test according to CS 27.965 d (simultaneous slosh and vibration, at 16 to 20 slosh cpm), and therefore has no comments or objections regarding the proposed AMC.

response

Noted.

AMC1 29.965 Fuel tank tests

p. 44

comment

56

comment by: AIRBUS HELICOPTERS

About AMC1 29.965 (b) Use of MIL-T-6396

AH COMMENT :

Airbus Helicopters agrees with the proposed text

AH JUSTIFICATION :

In this proposed AMC, EASA provides clarification regarding the appropriate use of MIL-DTL-6396, for those applicants who so wish. AH carries out the slosh and vibration test according to CS29.965 d (simultaneous slosh and vibration, at 16 to 20 slosh cpm), and therefore has no comments or objections regarding the proposed AMC.

response

Noted.

CS 29.1145 Ignition switches

p. 45

comment

231

comment by: General Aviation Manufacturers Association (GAMA)

CS 29.1145

Justification

It is not clear how the FADEC would check the health of each ignition circuit and whether the extend of the ignition circuits would include the igniters.

Proposed resolution

response	<p>EASA to provide further guidance as appropriate to clarify how the FADEC would check the health of each ignition circuit and the concep of ignition circuits and whether it would include the igniters.</p> <p>Accepted. AMC1 29.1145 has been modified to clarify the intent of the requirement.</p>
comment	<p>233 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 29.1145 (a)(3)</p> <p><u>Justification</u> The health condition check of each ignition circuit can only be demonstrated for new H/C incorporating H/C architecture and FADEC capability. This is the reason why the ignition circuit should be determined by procedure on legacy H/C.</p> <p><u>Proposed resolution</u> EASA to consider adding the following text to (a)(3):</p> <p>(3) check the health condition of each ignition circuit, which could be achieved indifferently in automatic or initiated test or by procedure if the FADEC does not incorporate the capability of such health condition monitoring.</p>
response	<p>Partially accepted. The CS text does not imply to have the check performed by a FADEC. For legacy systems, the check can be performed by the pilot and he or she can check the proper functioning of each ignition circuit. This has been clarified in the AMC.</p>
comment	<p>344 comment by: <i>TCCA-NAC</i></p> <p>CS 29.1145(a)</p> <p><u>Justification</u> The intent to include EEC controlled ignition is missed by the proposed wording "... means must be provided in the cockpit ..." because Engine EEC are not usually in the cockpit. Further, isolation between each engine control should not be specific to ignition switches only. Furthermore, I don't understand how the means to manage engine ignition should allow or impede the crew to conduct flights or manage "any other limitations". As proposed, this requirement should be moved from subpart E to subpart G. NB AMC1 29.1145(a) on page 46 implements the stated intent.</p> <p><u>Proposed resolution</u> Suggest to reword CS 29.1145(a) to "(a) For each engine, a means must be provided to: " ; maintain proposed (1) & (3) but revise (2) to read : (2) readily allow the crew to manage or abort starts, in-flight restarts and motorings.</p>
response	<p>Partially accepted. The control has to be placed in the cockpit. But it is not requested to have the EEC in the cockpit: this is the purpose of the terms 'via a system'.</p>

(2) has been revised according to the proposed resolution except for the motoring which is not related to the ignition circuit.

AMC1 29.1145(a) Ignition switches

p. 46

comment 57

comment by: AIRBUS HELICOPTERS

Airbus Helicopters suggests to delete paragraphs (b)(2)(i) and (b)(2)(ii) and to change AMC1 29.1145(a) as follows :

AH PROPOSED TEXT :

"Acceptable means of compliance to CS29.1145 (a) include the following design solutions :

(a) Independent ignition controls should be provided for each ignition circuit, or

(b) A single ignition control acting on two ignition switches should be provided to control each ignition circuit via a dual-channel FADEC.

(1) Each switch should be connected to one channel of the FADEC.

(2) Detailed architecture should satisfy the safety objectives of CS-E and CS-29

AH JUSTIFICATION :

AMC1 29.1145(a) is in line with the update of CS 29.1145(a), however the introduced AMC is limited to only two means, and is not clear whether this should be under CS-E or CS-29 regarding FADEC architecture.

The first sentence of AMC1 29.1145(a) "*Compliance with CS 29.1145(a) is considered to be demonstrated by providing for each engine one of the following design solutions*" could be understood as defining the only acceptable design solutions. A more open wording should be preferred in order to be less solution-prescriptive.

response

Noted

Not considered as per comment #234 (duplicated comment with GAMA).

comment 58

comment by: AIRBUS HELICOPTERS

Airbus Helicopters suggests to add a new subparagraph (c) in AMC1 29.1145(a) in order to complete the method of compliance with CS 29.1145 (a)(3):

AH PROPOSED TEXT :

"(c) *check of the health condition of each ignition circuit could be achieved indifferently in automatic or initiated test or by procedure if the FADEC does not incorporate the capability of such health condition monitoring*"

AH JUSTIFICATION :

About CS 29.1145 (a)(3) "*check the health condition of each ignition circuit;*", such requirement can be demonstrated only for new rotorcraft incorporating rotorcraft architecture and FADEC capable of such feature. It is reason why such ignition circuit condition should be determined by procedure on legacy rotorcraft.



response	<p>Partially accepted.</p> <p>The CS text does not imply to have the check performed by a FADEC. For legacy systems, the check can be performed by the pilot and he or she can check the proper functioning of each ignition circuit.</p> <p>This has been clarified in the AMC.</p>
comment	<p>214 comment by: <i>Leonardo Helicopters</i></p> <p>This new amendment is driving requirements / architecture definition: examples of acceptable architectures should be provided, in order to better clarify if ignition can be directly managed by FADEC only, or if dedicated control shall be provided at aircraft level.</p>
response	<p>Partially accepted.</p> <p>CS29.1145(a)(1) has been reworded to explain what can be a system.</p> <p>However, this new amendment does not prescribe requirements. On the contrary it opens the door to other solutions than dual controls in the cockpit for each ignition system.</p>
comment	<p>234 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1145 (a)</p> <p><u>Justification</u></p> <p>In line with the update of 1145(a) - however the introduced AMC is limited to only two means, and is not clear whether this should be under CS-E or CS-29 regarding FADEC architecture.</p> <p>The following wording "Compliance with CS 29.1145(a) is considered to be demonstrated by providing for each engine one of the following design solutions" could be understood as defining the only acceptable design solutions. A more open wording should be preferred.</p> <p><u>Proposed resolution</u></p> <p>EASA to consider deleting existing (b)(2)(i) and (b)(2)(ii) and rewording AMC1 29.1145(a) as follows :</p> <p>"Acceptable means of compliance to CS29.1145 (a) include following design solutions (a) Independent ignition controls should be provided for each ignition circuit, or (b) A single ignition control acting on two ignition switches should be provided to control each ignition circuit via a dual-channel FADEC.</p> <p style="padding-left: 40px;">(1) Each switch should be connected to one channel of the FADEC. (2) Detailed architecture should satisfy the safety objectives of CS-E and CS-29"</p>
response	<p>Partially accepted.</p> <p>The reference to CS-E has been removed. Engine installation requirements coming from the engine manufacturer are already covered by CS 29.901(b)(1)(i).</p> <p>CS 29.1145 is not more prescriptive. Other design solutions than those mentioned in the AMC could be proposed by applicants as means of compliance with CS 29.1145.</p>

CS 27.1305 Powerplant instruments

p. 46

comment	235 CS 27.1305 <u>Justification</u> The regular update should also consider including the specific means to indicate the gas temperature within the engine (as required by the TCDS, i.e. T45) <u>Proposed resolution</u> EASA to consider further clarifying the means to indicate the gas temperature within the engine.	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
response	Not accepted. The proposed change does not modify the meaning of 'gas temperature'. This activity is covered by the showing of compliance in the engine installation manual.	

CS 29.1305 Powerplant power plant instruments

p. 47

comment	236 CS 29.1305 <u>Justification</u> The regular update should also consider including the specific means to indicate the gas temperature within the engine (as required by the TCDS, i.e. T45) <u>Proposed resolution</u> EASA to consider further clarifying the means to indicate the gas temperature within the engine.	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
response	Not accepted. The proposed change does not modify the meaning of 'gas temperature'. This activity is covered by the showing of compliance in the engine installation manual.	

CS 29.1305 Powerplant power plant instruments

p. 48

comment	59 AH COMMENT : Airbus Helicopters agrees with the proposed change, ie. no change is requested in the frame of this regular update However, this change introduced in CS 29.1305 is limited to only one aspect of the OEI training mode. The need of a CRI ELOS may not be eliminated without addressing the case of the criticality of the FC ' <i>real engine loss of power during an OEI training</i> ' and associated compensating features. Airbus Helicopters suggests a dedicated RMT for	comment by: <i>AIRBUS HELICOPTERS</i>
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response	<p>addressing this topic, out of the scope of this regular update. For instance, this RMT could propose a guidance for operating instructions and Flight Manual Supplement related to the Cat A OEI training mode. An AMC-MG could be added to address CS 29.1305, 29.1309, 29.1525, 29.1549 and 29.1581 to 29.1587 for the overall compliance demonstration of the Cat A OEI Training Mode. In particular, the criticality of the FC of a real engine loss during Cat A OEI training mode, and associated compensating features to reduce the consequences or the exposure. Alternative solutions could be discussed with other stakeholders in the frame of a RMT to be initiated.</p> <p>Noted</p> <p>Not considered as per comment #237 (duplicated comment with GAMA).</p>
comment	<p>237 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 29.1305</p> <p><u>Justification</u> GAMA members agree with the proposed update on the OEI Training mode. However, this change appears to be limited only to one aspect of the OEI training mode, and only to Category A rotorcraft. Discussion with other stakeholders is needed within a dedicated RMT.</p> <p><u>Proposed resolution</u> EASA to consider a dedicated RMT for addressing this topic;</p> <p>Alternatively, EASA to consider, in the context of this regular update:</p> <p>a) extending the requirement to any multi-engine rotorcraft and to propose guidance for operating instructions and Flight Manual Supplement related to the Cat A and any other multi-engine aircraft OEI training mode.</p> <p>b) Adding an additional AMC/GM to address 1305, 1309, 1525, 1549 and 1581 to 1587 for the overall compliance demonstration of the Cat A OEI Training Mode. In particular, the criticality of the FC of a real engine loss during Cat A OEI training mode, and associated compensating features to reduce the consequences or the exposure.</p>
response	<p>Not accepted.</p> <p>Based on the experience acquired so far, EASA does not consider necessary to extend the requirement to any multi-engine rotorcraft.</p> <p>As a matter of fact, OEI training is regularly carried out as part of the recurrent Category A training. The need for additional AMC/GM to address other requirements was assessed during the last certification processes and found not necessary for Category A manoeuvres due to the guidance already provided by MG 22 of AC 29-2C.</p>

AMC1 27.903(d) Engines

p. 48

comment 60

comment by: AIRBUS HELICOPTERS



Airbus Helicopters suggests 6 changes to AMC1 27.903 as follows :

AH PROPOSED TEXT :

- Change #1 : Move the 3 first sentences of paragraph (b), ie. from "Compliance is usually shown by conducting..." to "depleted battery, etc.", into the paragraph (a) "Explanation"
- Change #2 : introduce a sub-paragraph (b)(1) for flight demonstration:
 - "Applicants are encouraged to demonstrate the capability in flight to show compliance with 27.903(d) ."
- Change #3 : introduce a sub-paragraph (b)(2) for ground demonstration with a first sentence :
 - "If the applicant chooses to demonstrate restart capability on ground only, the following factors should be considered and substantiated"

and with keeping the rest of the text dealing with the analysis proposed in the AMC :

- "Restarts should be conducted at various altitudes, [...] To minimise any potential height loss, the applicant should ensure that the engine restart can be initiated at the earliest opportunity."
- Change #4 : the following sentence :
 - "The engine certification should be checked to ensure that the flight manual procedures for in-flight restart are consistent with any specific engine restart requirements identified in the installation and/or operating manual of the engine."

should be modified into :

- "The installation and/or operating manual of the engine should be checked to ensure that the flight manual procedures for in-flight restart are consistent with any specific engine restart requirements, without adding complexity to the emergency procedure"
- Change #5 : the following sentence :
 - "The emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and detailed instructions for the restart."

should be moved at the very end of this AMC and slightly modified in:

- "considering all above factors, the emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and instructions for the restart based on these factors"



- Change #6: introduce a new sub-paragraph (c) for flight test substantiation by keeping only the sentence :
 - "The emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and instructions for the restart based on conducted flight tests"

AH JUSTIFICATION:

It is not so clear in this AMC whether all of the proposed analysis has to be done regardless of whether the demonstration is on the ground or in flight, or only when the tests are ground-based only. The intended AMC is to provide guideline for demonstrating restart capacity by ground testing AND associated analysis. The beginning of the paragraph (b) of this AMC can be interpreted just as a context. Moreover it should be clarified that the procedures section of the RFM should contain only the minimum required information, not all considered factors for the analysis (items 1 to 6 cannot all be included in the RFM). And although the procedure can be based on the Engine Manufacturer Operational Manual, it is the aircraft manufacturer responsibility to translate them at operational level, considering other factors and subsystems. It is proposed to fully reshape the AMC1 with the here above changes of the AH proposed text.

response

Noted

Not considered as per comment #238 (duplicated comment with GAMA).

comment

238

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

AMC1 27.903(d)

Justification

It is not so clear in these AMC if all the proposed analysis has to be done whatever the demonstration ground or flight, or only when the testing is ground based only.

The intended AMC is to provide guideline for demonstrating restart capacity by ground testing AND associated analysis. The beginning of AMC1 (b) can be interpreted as context as the beginning. Moreover it should be clarified that the procedures section of the RFM should contain only the minimum required information, not all considered factors for the analysis (items 1 to 6 cannot all be included in the RFM). And although the procedure can be based on the Engine Manufacturer Operational Manual, it is the aircraft manufacturer responsibility to translate them at operational level, considering other factors and subsystems.

Proposed resolution

EASA to consider to fully reshape the AMC1 with the following changes:

Change 1 : include the beginning of (b) from "Compliance is usually shown by conducting...." to "depleted battery, etc." into the §§ (a) "Explanation"

Change 2 : introduce a §§ (b)(1) for flight demonstration :



"Applicants are encouraged to demonstrate the capability in flight to show compliance with 27.903(d) ."

Change 3 : introduce a §§ (b)(2) for ground demonstration with a first sentence "If the applicant chooses to demonstrate restart capability on ground only, the following factors should be considered and substantiated" and with keeping the rest of the text dealing with the analysis proposed in the AMC :

"Restarts should be conducted at various altitudes, [...] To minimise any potential height loss, the applicant should ensure that the engine restart can be initiated at the earliest opportunity."

Change 4 : the sentence :

"The engine certification should be checked to ensure that the flight manual procedures for in-flight restart are consistent with any specific engine restart requirements identified in the installation and/or operating manual of the engine."

should be modified into :

"The installation and/or operating manual of the engine should be checked to ensure that the flight manual procedures for in-flight restart are consistent with any specific engine restart requirements, without adding complexity to the emergency procedure"

Change 5 : the sentence

"The emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and detailed instructions for the restart."

should be moved at the very end of this AMC and slightly modified in :

"considering all above factors, the emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and instructions for the restart based on these factors"

Change 6: introduce a §§ (c) for flight test substantiation by keeping only the sentence:

"The emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and instructions for the restart based on conducted flight tests"

response

Not accepted.

The intent of the AMC1 27.903(d) is not to reshuffle the entire guidance material but only to provide additional guidance for new single-engine designs. This will be considered for future updates.

comment

240

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

AMC1 27.903 (d)

Justification



	<p>Demonstration is not applicable for shutdown of all engines (i.e., not applicable for single engine rotorcraft). The AMC combines discussion of single engine products with multi-engine products which is confusing and creates ambiguity.</p> <p><u>Proposed resolution</u> EASA to correct the AMC to properly reflect CS 27.903(d) and separate the AMC for single engine rotorcraft and multi-engine rotorcraft.</p>
response	<p>Not accepted.</p>
	<p>The intent of AMC1 27.90 (d) is not to reshuffle the entire guidance material but only to provide additional guidance for new single-engine designs. This will be considered for future updates.</p>
comment	<p>242 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.903 (d)</p> <p><u>Justification</u> A note in the RFM to state that an in-flight shutdown was not demonstrated has been agreed in the past. Where demonstration is not required for SE rotorcraft, these options should be provided.</p> <p><u>Proposed resolution</u> EASA to provide the option to include a note in the RFM that an in-flight shutdown was not demonstrated.</p>
response	<p>Accepted.</p>
	<p>The option to include a note in the RFM was part of the initial proposal, but it was lost in the published NPA due to an editorial issue.</p>
comment	<p>244 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.903 (d), last paragraph</p> <p><u>Justification</u> Last paragraph includes the statement “To minimize any potential height loss, the applicant should ensure that the engine restart can be initiated at the earliest opportunity. The phrase “earliest opportunity” is ambiguous.</p> <p><u>Proposed resolution</u> EASA to clarify what is meant by “earliest opportunity”.</p>
response	<p>Not accepted.</p>
	<p>The meaning of the earliest opportunity is clear. The intent is to avoid that the aircraft will lose a significant amount of altitude before the engine is restarted.</p>
comment	<p>346 comment by: <i>TCCA-NAC</i></p>



response	<p>AMC1 27.903 (d)</p> <p><u>Justification</u> Contrary to other AMC proposed in this NPA, AMC1 27.903(d) is presented to replace FAA AC 27-1B § 27.903B. But there is only paragraph difference.</p> <p><u>Proposed resolution</u> Provide supplemental information in this AMC to complement AC 27.903B instead of replacement.</p>
	<p>Not accepted.</p> <p>Due to the limited scope of the changes, we preferred to replace FAA AC 27-1B § 27.903B with AMC1 27.903(d) to improve the readability.</p>
comment	<p>349 comment by: TCCA-NAC</p> <p>AMC1 27.903 (d)</p> <p><u>Justification</u> For consistency with “(e) Is altitude ...” preceeding, the word “height” in the last para should be replaced with “altitude”. NB there is no itemized list in AMC1 29.903(e) but the same text “...height loss...” appears.</p> <p><u>Proposed resolution</u> Reword the first line of the last paragraph of the proposed AMC1 27.903(d) to read “To minimize any potential altitude loss” Also reword similar sentence in AMC1 29.903(e).</p>
response	<p>Accepted.</p> <p>AMC1 27.903(d) has been modified accordingly.</p>

AMC1 29.903(e) Engines

p. 49

comment	<p>61 comment by: AIRBUS HELICOPTERS</p> <p>Airbus Helicopters suggests 6 changes to AMC1 29.903 as follows :</p> <p>AH PROPOSED TEXT :</p> <ul style="list-style-type: none"> • Change #1 : Move the 3 first sentences of paragraph (b), ie. from "<i>Compliance is usually shown by conducting....</i>" to "<i>depleted battery, etc.</i>", into the paragraph (a) "<i>Explanation</i>" • Change #2 : introduce a sub-paragraph (b)(1) for flight demonstration: <ul style="list-style-type: none"> ○ "<i>Applicants are encouraged to demonstrate the capability in flight to show compliance with 29.903(d) .</i>"
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- **Change #3** : introduce a sub-paragraph (b)(2) for ground demonstration with a first sentence :
 - *"If the applicant chooses to demonstrate restart capability on ground only, the following factors should be considered and substantiated"*

and with keeping the rest of the text dealing with the analysis proposed in the AMC :

- *"Restarts should be conducted at various altitudes, [...] To minimise any potential height loss, the applicant should ensure that the engine restart can be initiated at the earliest opportunity."*
- **Change #4** : the following sentence :
 - *"The engine certification should be checked to ensure that the flight manual procedures for in-flight restart are consistent with any specific engine restart requirements identified in the installation and/or operating manual of the engine."*

should be modified into :

- *"The installation and/or operating manual of the engine should be checked to ensure that the flight manual procedures for in-flight restart are consistent with any specific engine restart requirements, without adding complexity to the emergency procedure"*
- **Change #5** : the following sentence :
 - *"The emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and detailed instructions for the restart."*

should be moved at the very end of this AMC and slightly modified in :

- *"considering all above factors, the emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and instructions for the restart based on these factors"*
- **Change #6**: introduce a new sub-paragraph (c) for flight test substantiation by keeping only the sentence :
 - *"The emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and instructions for the restart based on conducted flight tests"*
 - **Change #7**: remove the following last sentence of the paragraph (b) on page 50 :



- "If the procedure was only demonstrated on ground, this should be stated in the RFM."

AH JUSTIFICATION:

It is not so clear in this AMC whether all of the proposed analysis has to be done regardless of whether the demonstration is on the ground or in flight, or only when the tests are ground-based only. The intended AMC is to provide guideline for demonstrating restart capacity by ground testing AND associated analysis. The beginning of the paragraph (b) of this AMC can be interpreted just as a context. Moreover it should be clarified that the procedures section of the RFM should contain only the minimum required information, not all considered factors for the analysis (items 1 to 6 cannot all be included in the RFM). And although the procedure can be based on the Engine Manufacturer Operational Manual, it is the aircraft manufacturer responsibility to translate them at operational level, considering other factors and subsystems. It is proposed to fully reshape the AMC1 with the here above changes of the AH proposed text.

Justification about change #7 : because the RFM should not state how the procedure has been demonstrated and it could introduce confusion for flight crew during critical phases of flight.

response

Noted

Not considered as per comment #239 (duplicated comment with GAMA).

comment

239

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

AMC1 29.903(e)

Justification

It is not so clear in these AMC if all the proposed analysis has to be done whatever the demonstration ground or flight, or only when the testing is ground based only.

The intended AMC is to provide guideline for demonstrating restart capacity by ground testing AND associated analysis. The beginning of AMC1 (b) can be interpreted as context as the beginning. Moreover it should be clarified that the procedures section of the RFM should contain only the minimum required information, not all considered factors for the analysis (items 1 to 6 cannot all be included in the RFM). And although the procedure can be based on the Engine Manufacturer Operational Manual, it is the aircraft manufacturer responsibility to translate them at operational level, considering other factors and subsystems.

Proposed resolution

EASA to consider to fully reshape the AMC1 with the following changes:

Change 1 : include the beginning of (b) from "Compliance is usually shown by conducting...." to "depleted battery, etc." into the §§ (a) "Explanation"

Change 2 : introduce a §§ (b)(1) for flight demonstration :

"Applicants are encouraged to demonstrate the capability in flight to show compliance with 29.903(e) ."



Change 3 : introduce a §§ (b)(2) for ground demonstration with a first sentence "If the applicant chooses to demonstrate restart capability on ground only, the following factors should be considered and substantiated" and with keeping the rest of the text dealing with the analysis proposed in the AMC :

"Restarts should be conducted at various altitudes, [...] To minimise any potential height loss, the applicant should ensure that the engine restart can be initiated at the earliest opportunity."

Change 4 : the sentence :

"The engine certification should be checked to ensure that the flight manual procedures for in-flight restart are consistent with any specific engine restart requirements identified in the installation and/or operating manual of the engine."

should be modified into :

"The installation and/or operating manual of the engine should be checked to ensure that the flight manual procedures for in-flight restart are consistent with any specific engine restart requirements, without adding complexity to the emergency procedure"

Change 5 : the sentence

"The emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and detailed instructions for the restart."

should be moved at the very end of this AMC and slightly modified in :

"considering all above factors, the emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and instructions for the restart based on these factors"

Change 6: introduce a §§ (c) for flight test substantiation by keeping only the sentence:

"The emergency and malfunction instruction sections of the RFM should present a detailed definition of the approved restart envelope and instructions for the restart based on conducted flight tests"

response

Not accepted.

The intent of AMC1 29.903(e) is not to reshuffle the entire guidance material but only to provide additional guidance for new single-engine designs. This will be considered for future updates.

comment

241

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

AMC1 27.903 (e)

Justification

Demonstration is not applicable for shutdown of all engines (i.e., not applicable for single engine rotorcraft). The AMC combines discussion of single engine products with multi-engine products which is confusing and creates ambiguity.



response	<p><u>Proposed resolution</u> EASA to correct the AMC to properly reflect CS 29.903(e) and separate the AMC for single engine rotorcraft and multi-engine rotorcraft.</p> <p>Not accepted.</p> <p>The intent of AMC1 29.903(e) is not to reshuffle the entire guidance material but only to provide additional guidance for new single-engine designs. This will be considered for future updates.</p>
comment	<p>243 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.903 (e)</p> <p><u>Justification</u> A note in the RFM to state that an in-flight shutdown was not demonstrated has been agreed in the past. Where demonstration is not required for SE rotorcraft, these options should be provided.</p> <p><u>Proposed resolution</u> EASA to provide the option to include a note in the RFM that an in-flight shutdown was not demonstrated.</p>
response	<p>Noted.</p> <p>The option to include a note in the RFM is already included in the proposed material.</p>
comment	<p>245 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.903 (e), last paragraph</p> <p><u>Justification</u> Last paragraph includes the statement “To minimize any potential height loss, the applicant should ensure that the engine restart can be initiated at the earliest opportunity. The phrase "earliest opportunity" is ambiguous.</p> <p><u>Proposed resolution</u> EASA to clarify what is meant by “earliest opportunity”.</p>
response	<p>Not accepted.</p> <p>The meaning of the earliest opportunity is clear. The intent is to avoid that the aircraft will lose a significant amount of altitude before the engine is restarted.</p>
comment	<p>246 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.903 (e), last sentence</p>

	<p><u>Justification</u> The sentence “If the procedure was only demonstrated on ground, this should be stated in the RFM.” seems to indicate that the aircraft either complies with CS 29.903 (e) or not, which is ambiguous. The RFM should not state how the procedure has been demonstrated and it could introduce confusion for flight crew during critical phases of flight.</p> <p><u>Proposed resolution</u> EASA to consider deleting the sentence as it seems ambiguous and could introduce confusion.</p>
response	<p>Not accepted.</p> <p>Notwithstanding that applicants are encouraged to demonstrate the capability in flight, if this was not the case, the information that the procedure has been only tested on ground is considered critical and should be furnished in the RFM. This approach has been already adopted by EASA in past certification projects.</p>
comment	<p>247 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p>
	<p>AMC1 29.903 (e)</p> <p><u>Justification</u> AMC for CS 29.903(e) is not consistent with AMC for CS 27.903(d) in content or format.</p> <p><u>Proposed resolution</u> Make AMC for CS 29.903(e) consistent with AMC for CS 27.903(d).</p>
response	<p>Not accepted.</p> <p>The two AMC refer to two different rules. The harmonisation of the corresponding AMC is not within the scope of this rulemaking task. This will be considered for future updates.</p>
comment	<p>347 comment by: TCCA-NAC</p>
	<p>AMC1 29.903 (e)</p> <p><u>Justification</u> Similarly to AMC1 27.903(d) There is an additional sentence at the end to declare in RFM if re-start procedure was only demonstrated on ground. What is expected of the crew?</p> <p><u>Proposed resolution</u> Similarly to AMC1 27.903(d) To maintain confidence of the crew in the emergency procedures and adherence to clear and unambiguous instructions, declaration of demonstration for single engine in-flight restart should NOT be included in RFM for single engine part 29 helicopters..</p>
response	<p>Not accepted.</p>



Notwithstanding that applicants are encouraged to demonstrate the capability in flight, if this was not the case, the information that the procedure has been only tested on ground is considered critical and should be furnished in the RFM. Based on this information, the crew may decide not to perform the engine restart procedure. This approach has been already adopted by EASA in past certification projects.

comment	348	comment by: TCCA-NAC
	AMC1 29.903 (e)	
	<p><u>Justification</u> For consistency with "(e) Is altitude ..." preceding, the word "height" in the last para should be replaced with "altitude". NB there is no itemized list in AMC1 29.903(e) but the same text "...height loss..." appears</p> <p><u>Proposed resolution</u> Reword the first line of the last paragraph of the proposed AMC1 27.903(d) to read "To minimize any potential altitude loss" Also reword similar sentence in AMC1 29.903(e)</p>	
response	Accepted.	
	AMC1 29.903(e) has been modified accordingly.	

AMC1 27.1301 Function and installation

p. 50

comment	62	comment by: AIRBUS HELICOPTERS
	About AMC1 27.1301 (b)(2) :	
	<p>AH PROPOSED TEXT : Airbus Helicopters suggests replacing all occurrences (6) of "general rule" with "CS 27.1301" throughout the paragraph (b)(2).</p> <p>AH JUSTIFICATION : The paragraph (a) of this AMC refers to "CS 27.1301" whereas the paragraph (b) (2) refers to "This general rule" which is ambiguous. it is suggested to clarify and to harmonize by referring only to "CS 27.1301".</p>	
response	Partially accepted.	
	Only the first occurrence of 'general rule' can be changed in CS 27.1301 to improve the clarity of the text. All the rest of the paragraph is general and, as it is explained at the end of the paragraph itself, it is applicable to 27.1309 and it is another general rule.	
comment	64	comment by: AIRBUS HELICOPTERS
	About AMC1 27.1301 (b)(1) :	



	<p>Airbus Helicopters suggests in bold and underlined the following change in the first sentence of AMC1 27.1301 (b)(1) :</p> <p><u>AH PROPOSED TEXT :</u> <i>"(1) Information regarding installation limitations and proper functioning is normally available from the ETSO article equipment manufacturers in their installation and operation manuals. [...]"</i></p> <p><u>AH JUSTIFICATION :</u> It is proposed to clarify the information provided by the equipment manufacturer.</p>
response	<p>Noted</p> <p>Not considered as per comment #250 (duplicated comment with GAMA).</p>
comment	<p>223 comment by: <i>Bell</i></p> <p>Item 18 is titled “Non-required equipment in the primary field of view”, yet the AMC does not make this distinction. The way it is written it could be interpreted to apply to any optional installed equipment which is not appropriate for equipment that is installed for non-aviation purposes like operator consoles, entertainment systems, cameras, etc. These systems must not create hazards, but the functioning is governed by customer satisfaction not by 27.1301.</p> <p>The AMC needs to be clear that it applies to optional equipment in the primary field of view and not to equipment that is installed for non-aviation purposes.</p>
response	<p>Partially accepted.</p> <p>The AMC has been written with the intent to make it applicable to all optional equipment. Therefore, it is acknowledged that the title of the item is misleading and has been changed.</p> <p>The proposed AMC makes it clear that the applicant is expected to determine, through the definition of the equipment intended function, what the impact on the crew tasks is and propose an investigation that is consistent with the intended function.</p>
comment	<p>248 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.1301</p> <p><u>Justification</u> Item 18 is titled “Non-required equipment in the primary field of view”, yet the AMC does not make this distinction.</p> <p><u>Proposed resolution</u> The AMC needs to be clear that it applies to optional equipment in the primary field of view.</p>
response	<p>Partially accepted.</p>

The AMC has been written with the intent to make it applicable to all optional equipment. Therefore, it is acknowledged that the title of the item is misleading and has been changed.

The proposed AMC makes it clear that the applicant is expected to determine, through the definition of the equipment intended function, what the impact on the crew tasks is and propose an investigation that is consistent with the intended function.

comment	<p>250 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.1301 (b)(1)</p> <p><u>Justification</u> Point (b)(1) should specify which information is to be provided by the equipment manufacturer</p> <p><u>Proposed resolution</u> EASA to emphasize the information to be provided by the equipment manufacturer is from the ETSO article, as proposed:</p> <p>(1) Information regarding installation limitations and proper functioning is normally available from the ETSO article equipment manufacturers in their installation and operation manuals.</p>
response	<p>Not accepted.</p> <p>Although some items of equipment may have an ETSO approval, others may be not provided with it. The current text is more general and addresses both cases.</p>

AMC1 29.1301 Function and installation

p. 51

comment	<p>63 comment by: <i>AIRBUS HELICOPTERS</i></p> <p>About AMC1 29.1301 (b)(2) :</p> <p>AH PROPOSED TEXT : Airbus Helicopters suggests replacing all occurrences (6) of “<i>general rule</i>” with “<i>CS 29.1301</i>” throughout the paragraph (b)(2).</p> <p>AH JUSTIFICATION : For consistency purpose with AMC1 27.1301 (b)(2) (see comment #62), reference to “<i>general rule</i>” is ambiguous, and therefore it is suggested to clarify and to harmonize by referring only to “<i>CS 29.1301</i>”.</p>
response	<p>Partially accepted.</p> <p>Only the first occurrence of ‘general rule’ can be changed in CS 29.1301 to improve the clarity of the text. All the rest of the paragraph is general and, as it is explained at the end of the paragraph itself, it is applicable to 29.1309 and it is another general rule.</p>



comment	<p>65 comment by: AIRBUS HELICOPTERS</p> <p>About AMC1 29.1301 (b)(1) :</p> <p>Airbus Helicopters suggests in bold and underlined the following change in the first sentence of AMC1 29.1301 (b)(1) :</p> <p><u>AH PROPOSED TEXT :</u> <i>"(1) Information regarding installation limitations and proper functioning is normally available from the ETSO article equipment manufacturers in their installation and operation manuals. [...]"</i></p> <p><u>AH JUSTIFICATION :</u> It is proposed to clarify the information provided by the equipment manufacturer.</p>
response	<p>Not accepted.</p> <p>Although some items of equipment may have an ETSO approval, others may be not provided with it. The current text is more general and addresses both cases.</p>
comment	<p>224 comment by: Bell</p> <p>Item 18 is titled "Non-required equipment in the primary field of view", yet the AMC does not make this distinction. The way it is written it could be interpreted to apply to any optional installed equipment which is not appropriate for equipment that is installed for non-aviation purposes like operator consoles, entertainment systems, cameras, etc. These systems must not create hazards, but the functioning is governed by customer satisfaction not by 29.1301.</p> <p>The AMC needs to be clear that it applies to optional equipment in the primary field of view and not to equipment that is installed for non-aviation purposes.</p>
response	<p>Partially accepted.</p> <p>The AMC has been written with the intent to make it applicable to all optional equipment. Therefore, it is acknowledged that the title of the item is misleading and has been changed.</p> <p>The proposed AMC makes it clear that the applicant is expected to determine, through the definition of the equipment intended function, what the impact on the crew tasks is and propose an investigation that is consistent with the intended function.</p>
comment	<p>249 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>AMC1 29.1301</p> <p><u>Justification</u> Item 18 is titled "Non-required equipment in the primary field of view", yet the AMC does not make this distinction.</p> <p><u>Proposed resolution</u></p>

response	<p>The AMC needs to be clear that it applies to optional equipment in the primary field of view.</p> <p>Partially accepted.</p> <p>The AMC has been written with the intent to make it applicable to all optional equipment. Therefore, it is acknowledged that the title of the item is misleading and has been changed.</p> <p>The proposed AMC makes it clear that the applicant is expected to determine, through the definition of the equipment intended function, what the impact on the crew tasks is and propose an investigation that is consistent with the intended function.</p>
comment	<p>362 comment by: TCCA</p> <p>About AMC1 29.1301 :</p> <p><u>PROPOSED TEXT :</u> Typos: “requiredequipment”; “itsprovisions”</p> <p><u>JUSTIFICATION :</u> “required equipment”; “its provisions”</p>
response	<p>Accepted.</p> <p>The text has been reviewed and the indicated typos have been corrected.</p>
comment	<p>363 comment by: TCCA</p> <p>About AMC1 29.1301 :</p> <p><u>PROPOSED TEXT :</u> The proposed amendment preamble for change #18, in pages 8 and 12 define the scope as “non-required equipment in the primary field of view”. Whilst the intent of the proposed amendment is clear, however, the proposed AMC1 27.1301 and AMC1 29.1301 in pages 50 and 51 do not contain any such scope definition and will allow for interpretation that the acceptable means of compliance and guidance material under these paragraphs are applicable to any equipment, in the primary field of view or not.</p> <p><u>JUSTIFICATION :</u> Add “‘function and installation’ applies to both required and optional / non-required installed equipment, in particular to equipment providing information in the crew primary field of view” to AMC1 27.1301 (a) and to AMC1 29.1301 (a)</p>
response	<p>Partially accepted.</p> <p>The AMC has been written with the intent to make it applicable to all optional equipment. Therefore, it is acknowledged that the title of the item is misleading and has been changed.</p> <p>The proposed AMC makes it clear that the applicant is expected to determine, through the definition of the equipment intended function, what the impact on the crew tasks is and propose an investigation that is consistent with the intended function.</p>

AMC1 27.251 Vibration

p. 61

comment	<p>66 comment by: AIRBUS HELICOPTERS</p> <p>About the last sentence of AMC1 27.251 : "<i>For any installation, the failure of which or its attachment would have a hazardous or catastrophic consequence, a fatigue evaluation should be performed when the vibrations are likely to affect the fatigue strength.</i>"</p> <p>Airbus Helicopters suggests removing the term "<i>hazardous</i>" in the last sentence of AMC1 27.251 as follows :</p> <p>AH PROPOSED TEXT : "<i>[...] For any installation, the failure of which or its attachment would have a hazardous or catastrophic consequence, a fatigue evaluation should be performed when the vibrations are likely to affect the fatigue strength.</i>"</p> <p>AH JUSTIFICATION : The proposed wording of the AMC is not in line with the CS 27.571 and CS 27.573 Fatigue evaluation requirements. The CS 27.571 and CS 27.573 regulation requires a fatigue evaluation to avoid Catastrophic Failure during the operational life of the rotorcraft. In other term, a fatigue evaluation of Principal Structural Element (PSE) when dealing with CS 27.571 and CS27.573 when the AMC also requests a fatigue evaluation of part attachment which would have a hazardous consequence. The application to part attachment which would have an hazardous consequence must be deleted.</p>
response	<p>Noted</p> <p>Not considered as per comment #255 (duplicated comment with GAMA).</p>
comment	<p>68 comment by: AIRBUS HELICOPTERS</p> <p>About the first sentence of the second paragraph of AMC1 27.251 : "<i>The applicant should investigate each individual installation of the rotorcraft for compliance with CS 27.251.</i>"</p> <p>AH COMMENT : The meaning of the term "<i>installation</i>" in the here above sentence should be clarified. This wording is too vague comparatively to the NPA objective which is to provide guidance to potential equipment detachment. Thus, it should be clarified if dealing with external equipment, item of mass, ... ? This AMC will not prevent need of existing CRI.</p>
response	<p>Noted</p> <p>Not considered as per comment #253 (duplicated comment with GAMA).</p>
comment	<p>251 comment by: General Aviation Manufacturers Association (GAMA)</p>



	<p>AMC1 27.251</p> <p><u>Justification</u> The engine manufacturers do not define limits for this type of vibration, hence it is not clear how the qualitative assessment could be performed.</p> <p><u>Proposed resolution</u> EASA to define how the qualitative assessment should be performed.</p>
response	<p>Noted.</p> <p>The qualitative assessment conducted during a flight test campaign should ensure no excessive vibration of the installation within the flight envelope. The specific assessment and criteria should be discussed as part of the certification activity, and are dependent on the installation.</p> <p>Typically, the source of vibration originates from the main and tail rotor. Vibrations may also originate from the engine or other sources.</p> <p>No change to the AMC is deemed necessary.</p>
comment	<p>253 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.251, second paragraph</p> <p><u>Justification</u> EASA should clarify the meaning of "installation" in the sentence "each individual installation of the rotorcraft".</p> <p>Too vague comparatively to the NPA objective which is to provide guidance to potential equipment detachment. It should be clarified if dealing with external equipment, item of mass?</p> <p>This AMC will not prevent existing CRI.</p> <p><u>Proposed resolution</u> EASA to clarify the meaning of 'installation'.</p>
response	<p>Noted.</p> <p>EASA refers to any installation, internal or external to the rotorcraft.</p> <p>No change to the AMC is deemed necessary.</p>
comment	<p>255 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.251, last sentence.</p> <p><u>Justification</u> If a part is identified as a PSE per 27/9.571 then 27/9.571 applies, otherwise it does not. Thus there should be no need to add the last sentence.</p> <p>Additionally, the proposed wording is not in line with the CS 27/29.571 and CS 27/29.573. The CS27/29.571 and CS27/29.573 require a fatigue evaluation to avoid Catastrophic Failure during the operational life of the rotorcraft. In other words, a fatigue evaluation of Principal Structural Element (PSE) is required when dealing with</p>

CS27/9.571 and CS27/29.573. This AMC seems to also request a fatigue evaluation of part attachment which would have a hazardous consequence. The application to part attachment which would have an hazardous consequence must be deleted.

Proposed resolution

EASA to consider deleting last sentence. Alternatively, EASA to delete any reference to 'hazardous' in as proposed:

'...For any installation, the failure of which or its attachment would have a ~~hazardous~~ or catastrophic consequence, a fatigue evaluation should be performed when the vibrations are likely to affect the fatigue strength...'

response

Accepted.

The reference to 'hazardous' has been removed.

AMC1 29.251 Vibration

p. 61

comment

67

comment by: AIRBUS HELICOPTERS

About the last sentence of AMC1 29.251 : "*For any installation, the failure of which or its attachment would have a hazardous or catastrophic consequence, a fatigue evaluation should be performed when the vibrations are likely to affect the fatigue strength.*"

Airbus Helicopters suggests removing the term "*hazardous*" in the last sentence of AMC1 29.251 as follows :

AH PROPOSED TEXT :

" [...] *For any installation, the failure of which or its attachment would have a **hazardous or catastrophic** consequence, a fatigue evaluation should be performed when the vibrations are likely to affect the fatigue strength.*"

AH JUSTIFICATION :

The proposed wording of the AMC is not in line with the CS 29.571 and CS 29.573 Fatigue evaluation requirements. The CS 29.571 and CS 29.573 regulation requires a fatigue evaluation to avoid Catastrophic Failure during the operational life of the rotorcraft. In other term, a fatigue evaluation of Principal Structural Element (PSE) when dealing with CS 29.571 and CS29.573 when the AMC also requests a fatigue evaluation of part attachment which would have a hazardous consequence. The application to part attachment which would have an hazardous consequence must be deleted.

response

Noted

Not considered as per comment #256 (duplicated comment with GAMA).

comment

69

comment by: AIRBUS HELICOPTERS



About the first sentence of the second paragraph of AMC1 29.251 : "*The applicant should investigate each individual installation of the rotorcraft for compliance with CS 29.251.*"

AH COMMENT :
 The meaning of the term "*installation*" in the here above sentence should be clarified. This wording is too vague comparatively to the NPA objective which is to provide guidance to potential equipment detachment. Thus, it should be clarified if dealing with external equipment, item of mass, ... ? This AMC will not prevent need of existing CRI.

response Noted

Not considered as per comment #254 (duplicated comment with GAMA).

comment 252 comment by: *General Aviation Manufacturers Association (GAMA)*
 AMC1 29.251

Justification
 The engine manufacturers do not define limits for this type of vibration, hence it is not clear how the qualitative assessment could be performed.

Proposed resolution
 EASA to define how the qualitative assessment should be performed.

response Noted.
 The qualitative assessment conducted during a flight test campaign should ensure no excessive vibration of the installation within the flight envelope. The specific assessment and criteria should be discussed as part of the certification activity, and are dependent on the installation.
 Typically, the source of vibration originates from the main and tail rotor. Vibrations may also originate from the engine or other sources.
 No change to the AMC is deemed necessary.

comment 254 comment by: *General Aviation Manufacturers Association (GAMA)*
 AMC1 29.251, second paragraph

Justification
 EASA should clarify the meaning of "installation" in the sentence "each individual installation of the rotorcraft".

Too vague comparatively to the NPA objective which is to provide guidance to potential equipment detachment. It should be clarified if dealing with external equipment, item of mass?

This AMC will not prevent existing CRI.

Proposed resolution
 EASA to clarify the meaning of 'installation'.



response	Noted. EASA refers to any installation, internal or external to the rotorcraft. No change to the AMC is deemed necessary.
comment	<p>256 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.251, last sentence.</p> <p><u>Justification</u> If a part is identified as a PSE per 27/9.571 then 27/9.571 applies, otherwise it does not. Thus there should be no need to add the last sentence.</p> <p>Additionally, the proposed wording is not in line with the CS 27/29.571 and CS 27/29.573. The CS27/29.571 and CS27/29.573 require a fatigue evaluation to avoid Catastrophic Failure during the operational life of the rotorcraft. In other words, a fatigue evaluation of Principal Structural Element (PSE) is required when dealing with CS27/9.571 and CS27/29.573. This AMC seems to also request a fatigue evaluation of part attachment which would have a hazardous consequence. The application to part attachment which would have an hazardous consequence must be deleted.</p> <p><u>Proposed resolution</u> EASA to consider deleting last sentence. Alternatively, EASA to delete any reference to 'hazardous' in as proposed:</p> <p>'...For any installation, the failure of which or its attachment would have a hazardous or catastrophic consequence, a fatigue evaluation should be performed when the vibrations are likely to affect the fatigue strength...'</p>
response	Accepted. The reference to 'hazardous' has been removed.

AMC2 29.917 Drive Rotor drive system design

p. 61

comment	<p>257 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC2 29.917 (h)(1)(ii)</p> <p><u>Justification</u> AMC2 29.917 (h)(1)(ii) already requires common cause failure modes of both the normal-use and auxiliary lubrication systems to be extremely remote or to be tested per 29.927 (c). The suggested revised wording is redundant with this and/or could be confusing when considered in combination. The aim of AMC2 29.917 (g)(1) is simply to identify the associated emergency procedures, other specifics are already addressed by (h)(1).</p> <p><u>Proposed resolution</u> EASA to keep the existing wording of AMC2 29.917(g)(1)</p>
response	Not accepted.



The purpose of the amendment is to ensure that the design can sustain safe operation for a minimum duration in case of combined loss of the primary and the auxiliary lubrication systems. This is considered needed to justify that any lubrication failure demonstrated to be at least extremely remote (i.e. excluded from the 30-minute safe flight capability demonstration of 29.927(c)) is also adequately addressed in the RFM emergency procedures.

Nevertheless, it seems that the text was not sufficiently clear, so amendments have been introduced to clarify that AMC2 29.917(g)(1):

- refers to extremely remote lubrication failures leading to loss of both normal use and auxiliary lubrication systems, and
- aims to ensure that the necessary RFM emergency procedures covering these extremely remote lubrication failures are adequately substantiated by test, regardless of whether 'land immediately' or increased flight durations are used.

comment

350

comment by: TCCA - NAC

AMC2 29.917

Justification

Revision to name of AMC2 by crossing out "Rotor drive system design" and replace with "Drive" doesn't make sense.

response

Accepted.
The wording has been corrected.

CS 29.811 Emergency exit marking

p. 62

comment

258

comment by: General Aviation Manufacturers Association (GAMA)

CS 29.811 (d)

Justification

Minimum symbolic element size is provided in terms of minimum height and minimum area. For the minimum height of 1.6 inches the minimum area of 10 square inches provided seems to imply an arrow symbol on each side of the running man as shown on page 63. The min. surface area would prevent the usage of a narrower sign with a single arrow or no arrow on either side of the running man in smaller/narrower cabin area.

Proposed resolution

Similarly, to the letter-based emergency exit sign it would be appropriate to provide a height to width ratio range.

response

Not accepted.

It is understood that the comment is related to AMC 29.811(d).



The size requirement is consistent with the equivalent AMC for CS-25. The height specified for the white symbolic element is a minimum requirement, whereas the 10 square inches is the minimum area for the sign. The proportions may be selected by the applicant as appropriate for the configuration. Arrows may not be necessary and are not implied. Additional acceptable examples have been added to the AMC.

AMC1 27.307 Proof of structure

p. 64

comment	259	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	AMC1 27.307	
	<u>Justification</u> Examples provided in the definitions are tailored to airplanes, as it is suspected this AMC was taken from AMC 25.307 or AC 25.307.	
	<u>Proposed resolution</u> Provide examples tied to rotorcraft structure and remove airplane examples.	
response	Accepted. Rotorcraft examples have been used instead of aeroplane examples.	
comment	261	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	AMC1 27.307 (f)(d)	
	<u>Justification</u> CS 27.307 (d) is referenced but does not exist in CS 27. This seems to be a copy from AMC for CS 25.	
	<u>Proposed resolution</u> Correct reference for CS 27/9.307(d).	
response	Accepted. The reference has been deleted.	
comment	263	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	AMC1 27.307 (f)(d)	
	<u>Justification</u> There are no requirements in CS 27 regarding explicit load factors to be used for static test of single load path structure. Forcing the use of one and its value through an AMC without an actual CS 27 requirement seems inadequate.	
	<u>Proposed resolution</u> Reference to CS 25.307(d) should be removed, along with the 1.15 factor. Reference to CS 27.619 could be made regarding the need for an additional factor in testing single	



	load path structure to address variability of material properties, however an actual factor should not be enforced through the AMC.
response	Partially accepted. The reference CS 27.307(d) has been removed. Material variability should be accounted for. An option to test the minimum quality component has been added, as an alternative to applying a factor. The reference to 27.619 is not considered applicable for this condition.
comment	265 comment by: <i>General Aviation Manufacturers Association (GAMA)</i> AMC1 27.307 (g) <u>Justification</u> If an analysis is not used to show compliance then correlation of analysis and test results is unnecessary. <u>Proposed resolution</u> EASA to revise wording as follows; 'If analytical methods are used for showing compliance and the test results do not correlate with the analysis, ...'
response	Not accepted. It is clear from the previous sentence that correlation is not necessary when test only has been performed. The AMC has not been updated.

AMC2 27.307 Proof of structure

p. 68

comment	70 comment by: <i>AIRBUS HELICOPTERS</i> About the last sentence of the second paragraph of AMC2 27.307 : " <i>Only further to AMC No. 2 to CS 25.301(b) the methods used to determine load intensities and distribution must be validated by flight load measurements unless the methods used for determining those loading conditions are shown to be reliable.</i> " AH COMMENT : This sentence above should be moved to the beginning of AMC2 27.307 to emphasize that the AMC is only applicable where there is no reliable procedure for determining loads.
response	Noted. Not considered as per comment #269 (duplicated comment with GAMA).
comment	267 comment by: <i>General Aviation Manufacturers Association (GAMA)</i> AMC2 27.307



	<p><u>Justification</u> Referring to CS-25 AMC is inappropriate for CS-27/29, as it is intended for Transport Category Airplanes.</p> <p><u>Proposed resolution</u> Remove references to CS-25 AMC.</p>
response	<p>Partially accepted. The reference to AMC 25.301 has been removed. AMC 25.301(b) is mentioned in a note only. EASA will consider the need to develop AMC 27.301 to provide further guidance for flight loads validation. When the methods used for determining those loading conditions are shown to be reliable, the flight load measurements may not be requested. AMC2 27.307 has been also updated to replace 'must' with 'should' where found appropriate.</p>
comment	<p>269 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC2 27.307</p> <p><u>Justification</u> The sentence 'Only further to AMC No. 2 to CS 25.301 (b)...' should be placed at the beginning in order to highlight that this AMC applies only when there is no reliable procedure to determine loads.</p> <p><u>Proposed resolution</u> EASA to consider placing that sentence at the beginning of AMC2 27.307</p>
response	<p>Partially accepted. The reference to AMC 25.301 has been removed. AMC 25.301(b) is mentioned in a note only. EASA will consider the need to develop AMC 27.301 to provide further guidance for flight loads validation. When the methods used for determining those loading conditions are shown to be reliable, the flight load measurements may not be requested. AMC2 27.307 has been also updated to replace 'must' with 'should' where found appropriate.</p>
comment	<p>271 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC2 27.307</p> <p><u>Justification</u> The proposed AMC is referring to CS 25.301(b) AMC in several instances.</p> <p><u>Proposed resolution</u> Future changes to said CS-25 AMC will not necessarily consider its use in CS-27 rotorcraft. If said AMC is of importance to CS-27 rotorcraft, then the content of the CS-25 AMC should be added directly to CS-27 AMC and tailored for rotorcraft.</p>

response Partially accepted.
 The reference to AMC 25.301 has been removed.
 AMC 25.301(b) is mentioned in a note only.
 EASA will consider the need to develop AMC 27.301 to provide further guidance for flight loads validation.
 When the methods used for determining those loading conditions are shown to be reliable, the flight load measurements may not be requested.
 AMC2 27.307 has been also updated to replace 'must' with 'should' where found appropriate.

AMC1 29.307 Proof of structure

p. 69

comment 260 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 29.307

Justification

Examples provided in the definitions are tailored to airplanes, as it is suspected this AMC was taken from AMC 25.307 or AC 25.307.

Proposed resolution

Provide examples tied to rotorcraft structure and remove airplane examples

response Accepted.
 Rotorcraft examples have been used instead of aeroplane examples.

comment 262 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 29.307 (f)(d)

Justification

CS 29.307 (d) is referenced but does not exist in CS 29. This seems to be a copy from AMC for CS 25.

Proposed resolution

Correct reference for CS 29.307 (d).

response Accepted.
 The reference has been deleted.

comment 264 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 29.307 (f)(d)

Justification

There are no requirements in CS 29 regarding explicit load factors to be used for static test of single load path structure. Forcing the use of one and its value through an AMC without an actual CS 29 requirement seems inadequate.

Proposed resolution

	Reference to CS 25.307(d) should be removed, along with the 1.15 factor. Reference to CS 29.619 could be made regarding the need for an additional factor in testing single load path structure to address variability of material properties, however an actual factor should not be enforced through the AMC.
response	Partially accepted. The reference CS 29.307(d) has been removed. Material variability should be accounted for. An option to test the minimum quality component has been added, as an alternative to applying a factor. The reference to 29.619 is not considered applicable for this condition.
comment	266 comment by: <i>General Aviation Manufacturers Association (GAMA)</i> AMC1 29.307 (h) <u>Justification</u> If an analysis is not used to show compliance then correlation of analysis and test results is unnecessary. <u>Proposed resolution</u> EASA to revise wording as follows; 'If analytical methods are used for showing compliance and the test results do not correlate with the analysis, ...'
response	Not accepted. It is clear from the previous sentence that correlation is not necessary when test only has been performed. The AMC has not been updated.

AMC2 29.307 Proof of structure

p. 73

comment	71 comment by: <i>AIRBUS HELICOPTERS</i> About the last sentence of the second paragraph of AMC2 29.307 : " <i>Only further to AMC No. 2 to CS 25.301(b) the methods used to determine load intensities and distribution must be validated by flight load measurements unless the methods used for determining those loading conditions are shown to be reliable.</i> " AH COMMENT : This sentence above should be moved to the beginning of AMC2 29.307 to emphasize that the AMC is only applicable where there is no reliable procedure for determining loads.
response	Noted Not considered as per comment #270 (duplicated comment with GAMA).
comment	268 comment by: <i>General Aviation Manufacturers Association (GAMA)</i>



response	<p>AMC2 29.307</p> <p><u>Justification</u> Referring to CS-25 AMC is inappropriate for CS-27/29, as it is intended for Transport Category Airplanes.</p> <p><u>Proposed resolution</u> Remove references to CS-25 AMC.</p> <p>Partially accepted. The reference to AMC 25.301(b) has been removed. AMC 25.301(b) is mentioned in a note only. EASA will consider the need to develop AMC 29.301 to provide further guidance for flight loads validation. When the methods used for determining those loading conditions are shown to be reliable, the flight load measurements may not be requested. AMC2 29.307 has been also updated to replace 'must' with 'should' where found appropriate.</p>
comment	<p>270 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC2 29.307</p> <p><u>Justification</u> The sentence 'Only further to AMC No. 2 to CS 25.301 (b)...' should be placed at the beginning in order to highlight that this AMC applies only when there is no reliable procedure to determine loads.</p> <p><u>Proposed resolution</u> EASA to consider placing that sentence at the beginning of AMC2 29.307</p>
response	<p>Partially accepted. The reference to AMC 25.301(b) has been removed. AMC 25.301(b) is mentioned in a note only. EASA will consider the need to develop AMC 29.301 to provide further guidance for flight loads validation. When the methods used for determining those loading conditions are shown to be reliable, the flight load measurements may not be requested. AMC2 29.307 has been also updated to replace 'must' with 'should' where found appropriate.</p>
comment	<p>272 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC2 29.307</p> <p><u>Justification</u> The proposed AMC is referring to CS 25.301(b) AMC in several instances.</p> <p><u>Proposed resolution</u></p>

	<p>Future changes to said CS-25 AMC will not necessarily consider its use in CS-29 rotorcraft. If said AMC is of importance to CS-27/9 rotorcraft, then the content of the CS-25 AMC should be added directly to CS-29 AMC and tailored for rotorcraft.</p>
<p>response</p>	<p>Partially accepted. The reference to AMC 25.301(b) has been removed. AMC 25.301(b) is mentioned in a note only. EASA will consider the need to develop AMC 29.301 to provide further guidance for flight loads validation. When the methods used for determining those loading conditions are shown to be reliable, the flight load measurements may not be requested. AMC2 29.307 has been also updated to replace ‘must’ with ‘should’ where found appropriate.</p>

AMC1 27.607 Fasteners	p. 74
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<p>comment</p>	<p>72 comment by: AIRBUS HELICOPTERS</p>
	<p>About the title "Fasteners" and the first sentence of AMC1 27.607 : "<i>This AMC supplements FAA AC 27-1B, § AC 27.607 and should be used in conjunction with that AC when demonstrating compliance with CS 27.607.</i>"</p> <p>AH COMMENT : Airbus Helicopters suggests modifying the Title of the AMC by not relating it to CS27.607 which is misleading regarding its objective.</p> <p>AH PROPOSED TEXT : Airbus Helicopters suggests modifying the first sentence of the AMC as follows : "<i>This AMC supplements FGM No. 2 to 21.A.139(a) and GM to 21.A.133(a) and should be used when demonstrating compliance with CS27.601, CS27.602, CS27.603, CS27.607.</i>"</p> <p>AH JUSTIFICATION : AMC1 27.607 Fasteners is an exact copy/paste of EASA CM-S-003 - <i>Application of Standard Fasteners (nuts and bolts)</i> which refers to CS27.601, 602, 603, 607. The purpose of the CM was to provide DAHs with guidance on appropriate actions to ensure appropriate utilisation of Standard Fasteners in their designs, to help them to instruct POAs and MOAs as necessary to ensure CAW and to provide means by which unsafe conditions related to the use in design of Standard Fasteners can be prevented. The CM reminds the obligations of the POA with respect to standard parts GM No. 2 to 21.A.139(a) and GM to 21.A.133(a). Except by reference to the Regulation Title of CS27.607, Fasteners, the purpose of this AMC is not to manage dual locking device issue, but POA and MOA issue regarding Standard fasteners.</p>
<p>response</p>	<p>Noted</p> <p>Not considered as per comment #275 (duplicated comment with GAMA).</p>
<p>comment</p>	<p>211 comment by: European Helicopter Association</p>



response	<p>Item 27: Use of Standard Fasteners in Critical installations. The change introduces the need for additional controls on fasteners used in critical locations. This will result in increased cost of fasteners used in critical locations from the fasteners that are used in current products. The use of controlled fasteners will significantly increase the cost to operators who will be forced to procure fasteners from aircraft manufacturer or specific approved sources as opposed to traditional supply chain sources that are used today. The increased cost to operators needs to be properly understood and assessed.</p> <p>Not accepted</p> <p>It is acknowledged that the use of qualified fasteners, when necessary, instead of standard fasteners in critical locations may increase the costs. However, taking into account the comparable small numbers of standard fasteners in critical locations and the consequence of failures of these fasteners, the safety benefit outweighs the additional costs.</p>
comment	<p>225 comment by: <i>Bell</i></p> <p>The need to select appropriate standards in critical applications is agreed, however when parts are manufactured to a standard the premise is that the part meets that standard, not something less. OEMs are required to maintain controlled sources of standard parts which ensure the integrity of the part to the standard. Other entities involved in the maintenance of aircraft are also bound by the same requirements to ensure the sources of supply of standard fasteners are also trusted and reliable.</p> <p>The AMC proposed by EASA goes beyond what has been accepted through CRIs and CMs and is a <u>very</u> complex and controversial topic. The proposed AMC will add significant burden to OEMs, Maintainers and Operators due to the increased cost related to the controls that are proposed. The changes do not meet the criteria of non-complex and non-controversial and need to be assessed in a dedicated rulemaking activity.</p> <p>The changes do not meet the criteria of non-complex and non-controversial. Remove AMC1 27.607 and AMC1 29.607 from the NPA and initiate a dedicated RMT with appropriate industry involvement and conduct the appropriate cost impact analysis to ensure that impacts are properly assessed.</p>
response	<p>Noted</p> <p>Not considered as per comment #330 (duplicated comment with GAMA).</p>
comment	<p>227 comment by: <i>Bell</i></p> <p>AMC1 27.607(c)(3)</p> <p>The identification of a critical installation does not automatically require that qualified standard fasteners be used. The design assessment needs to ensure that the appropriate types and quantities of fasteners are used. The design assessment may also conclude that qualified fasteners are to be used, but this is not explicitly required.</p> <p>Requiring qualified standard fasteners in critical locations will add significant cost.</p>

response	<p>Remove the expectation for fasteners used in critical installations to be qualified standard fasteners.</p> <p>Partially accepted.</p> <p>Qualified standard fasteners are not explicitly required for all critical installations. The reliability of a standard part or any other part specified in the design needs to be assessed and shown to be compatible with the design objectives. No change to the wording is considered necessary.</p> <p>See also the response to comment #211.</p>
comment	<p>273 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.607</p> <p><u>Justification</u></p> <p>The AMC includes several statements concerning manufacturing processes and quality of standard fasteners in the context of the type design definition. The responsibility from the type design perspective is to ensure the design complies with the applicable certification basis and is safe. When standard fasteners are selected they need to be appropriate for the application including the intended environment, and per 27.601 take into account in-service experience.</p> <p>The basic assumption during design and showing of compliance is that the fastener meets its specification and based on that is appropriate for the intended application. Design practices and assessment of potential hazards are also to be assessed to ensure the appropriate number of fasteners are used and the appropriate amount of redundancy is provided.</p> <p>Manufacturing and quality of standard fasteners is not a TC Applicant/Holder responsibility. The manufacturing and quality of a fastener is the responsibility of the Production or Maintenance Organization to ensure the fastener is manufactured in accordance with the standard. Oversight of these organizations to ensure this is the responsibility of the applicable State or Agency.</p> <p><u>Proposed resolution</u></p> <p>The proposed AMC must separate the responsibilities of the TC Applicant/Holder from the Production Organization or Maintenance Organization.</p> <p>The TC Applicant and TC Holder are responsible for compliance based on CS-27 and are not responsible to ensure that standard fasteners are manufactured correctly.</p> <p>The Production or Manufacturing organization are responsible to ensure that all parts, including standard fasteners are manufactured in accordance with the applicable specifications.</p>
response	<p>Not Accepted</p>

In general, standard fasteners may not be produced by production organisations as per Part 21. Consequently, there may be no production organisation ensuring an adequate quality control.

Maintenance organisations might be capable of identifying obvious damages on standard fasteners, but they cannot identify all parameters defined in the standard for the fastener.

Consequently, the design organisation has to ensure that the parts used in their design do meet the minimum specifications considered during certification.

In addition, CS 27.601 requires that the rotorcraft may have no design features or details that experience has shown to be hazardous or unreliable and there has been some negative in-service experience of the use of standard parts in critical installations. It is the TC or STC applicant's responsibility, in accordance with 21A.20, to ensure that the reliability of a standard part or any other part specified in the design is compatible with the design objectives.

comment 275 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 27.607

Justification

The proposed text is based on EASA CM-S-003 - Application of Standard Fasteners (nuts and bolts) , which refers to CS27 601, 602, 603 and 607. The purpose of the CM was to provide DAHs with guidance on appropriate actions to ensure appropriate utilisation of Standard Fasteners in their designs, and help them to instruct POAs and MOAs as necessary for CAW assurance purposes. Also, it was intended to provide means by which unsafe conditions related to the use in design of Standard Fasteners can be prevented. The CM reminds the obligations of the POA with respect to standard parts GM No. 2 to 21.A.139(a) and GM to 21.A.133(a).

Except by reference to the Regulation Title of CS 27.607, Fasteners, the purpose of this AMC is not to manage dual locking device issue, but POA and MOA issue regarding Standard fasteners.

Proposed resolution

EASA to consider:

a) changing the title of the AMC and not relate it to 27.607 exclusively, as it is misleading regarding its objective.

b) rewording the first paragraph to emphasize this AMC should be used when demonstrating compliance with CS 27.601, 602, 603 and 607, as proposed:

"This AMC supplements FGM No. 2 to 21.A.139(a) and GM to 21.A.133(a) and should be used when demonstrating compliance with CS 27.601, 602, 603, 607."

response Partially accepted



The text has been adapted to include CS 27.601, .602 and .603.

comment	277	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	AMC1 27.607	
	<p><u>Justification</u></p> <p>The proposed AMC states that it will supplement FAA AC 27-1B & AC 27.607 when demonstrating compliance with CS 27.607. However, CS 27.607 only states requirements tied to locking features of fasteners.</p>	
	<p><u>Proposed resolution</u></p> <p>EASA to clarify the scope of AMC1 27.607 and whether it is intended as additional requirements or compliance demonstrations for CS 27.602, 603, 605, and 613.</p>	
response	Partially accepted	
	See the response to comment #275.	

comment	279	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	AMC1 27.607 (c) (5)	
	<p><u>Justification</u></p> <p>The responsibility to ensure standard fasteners are manufactured properly and conform to the applicable design are the responsibility of the Production or Maintenance organization not the TC Applicant. Adding requirement for the manufacture of standard fasteners in the type design is redundant.</p>	
	<p><u>Proposed resolution</u></p> <p>Remove the need for the TC Applicant to include requirements for conformity, acceptance, storage of standard fasteners.</p>	
response	Not accepted	
	See the response to comment 273.	

comment	330	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	AMC1 27.607	
	<p><u>Justification</u></p> <p>The need to select appropriate standards in critical applications is agreed, however when parts are manufactured to a standard the premise is that the part meets that standard, not something less. OEMs are required to maintain controlled sources of standard parts which ensure the integrity of the part to the standard. Other entities involved in the maintenance of aircraft are also bound by the same requirements to ensure the sources of supply of standard fasteners are also trusted and reliable.</p>	

response	<p>The AMC proposed by EASA goes beyond what has been accepted through CRIs and CMs and is a very complex and controversial topic. The proposed AMC will add significant burden to OEMs, Maintainers and Operators due to the increased cost related to the controls that are proposed. The changes do not meet the criteria of non-complex and non-controversial and need to be assessed in a dedicated rulemaking activity.</p> <p><u>Proposed resolution</u> The changes do not meet the criteria of non-complex and non-controversial. Remove AMC1 27.607 and AMC1 29.607 from the NPA and initiate a dedicated RMT with appropriate industry involvement and conduct the appropriate cost impact analysis to ensure that impacts are properly assessed.</p> <p>Not accepted</p> <p>The proposed AMC is based on CM-S-003, which was publicly consulted and based on several CRIs raised during certification projects. In addition, see the response to comment #273.</p>
comment	<p>351 comment by: <i>Andre Luis Garcia</i></p> <p>AMC1 27.607 (c)</p> <p><u>Justification</u> To be more emphatic in the rule: “Once demonstrated, conformance to a standard provides a certain level of reliability under known loading and environmental conditions. “</p> <p><u>Proposed resolution</u> “Once demonstrated, conformance to a standard provides an adequated level of reliability agreed with authorities under known loading and environmental conditions. “</p>
response	<p>Not accepted.</p> <p>The standard provides a certain level of reliability, which may not be adequate for critical installations.</p>
comment	<p>352 comment by: <i>Andre Luis Garcia</i></p> <p>AMC1 27.607 (c) (4)</p> <p><u>Justification</u> To better clarify: “ (4) defining how the standard fastener is qualified wherever necessary;</p> <p><u>Proposed resolution</u> To add more information about what NPA is requesting the applicant to inform about type of qualification needed.</p>
response	<p>Not accepted.</p>



It is acknowledged that the wording used is not precise. However, the qualification of a fastener depends on the kind of fastener, material, dimensions, manufacturing process and the installation.

comment	353	comment by: <i>Andre Luis Garcia</i>
	AMC1 27.607 (c) (7)	
	<u>Justification</u>	
	To avoid unbiguites: . (7)...Typically standard parts are not appropriate for use as critical parts. “	
	<u>Proposed resolution</u>	
	Eliminate “typically” : “(7)...Standard parts are not appropriate for use as critical parts. “	
response	Not accepted	
	The text states that standard fasteners are not appropriate for use as critical parts in the majority of cases. However, the use of standard fasteners as critical parts cannot be excluded for all possible scenarios. Therefore, in order not to unnecessarily limit the applicant, the possibility to use a standard fastener as a critical part is given, provided that the reliability is compatible with the design objectives. All critical parts are subject to a critical parts plan that controls their critical characteristics during production and service.	

AMC1 29.607 Fasteners

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comment	4	comment by: <i>Stefan Stroeker</i>
	<p>Comment to section (b)(1):</p> <p>These certain standards could be: ISO, DIN, Military Specification (MILSpec), National Aerospace Standards (NAS), Army-Navy Aeronautical Standard (AN), Society of Automotive Engineers (SAE), American National Standards Institute (ANSI), EN Specifications, etc.</p> <p>Manufacturers of standard parts must confirm the applied norm/standard/specification by creation of so-called „Certificate of Conformity“ documents.</p>	
response	Noted	
comment	73	comment by: <i>AIRBUS HELICOPTERS</i>
	<p>About the title "Fasteners" and the first sentence of AMC1 29.607 : "<i>This AMC supplements FAA AC 29-1B, § AC 29.607 and should be used in conjunction with that AC when demonstrating compliance with CS 29.607.</i>"</p> <p>AH COMMENT :</p>	



Airbus Helicopters suggests modifying the Title of the AMC by not relating it to CS29.607 which is misleading regarding its objective.

AH PROPOSED TEXT : Airbus Helicopters suggests modifying the first sentence of the AMC as follows : "*This AMC supplements FGM No. 2 to 21.A.139(a) and GM to 21.A.133(a) and should be used when demonstrating compliance with CS29.601, CS29.602, CS29.603, CS29.607.*"

AH JUSTIFICATION :

AMC1 29.607 Fasteners is an exact copy/paste of EASA CM-S-003 - *Application of Standard Fasteners (nuts and bolts)* which refers to CS29.601, 602, 603, 607. The purpose of the CM was to provide DAHs with guidance on appropriate actions to ensure appropriate utilisation of Standard Fasteners in their designs, to **help them to instruct POAs and MOAs** as necessary to ensure CAW and to provide means by which unsafe conditions related to the use in design of Standard Fasteners can be prevented. The CM reminds the obligations of the POA with respect to standard parts GM No. 2 to 21.A.139(a) and GM to 21.A.133(a). Except by reference to the Regulation Title of CS29.607, Fasteners, the purpose of this AMC is not to manage dual locking device issue, but POA and MOA issue regarding Standard fasteners.

response

Noted

Not considered as per comment #276 (duplicated comment with GAMA).

comment

226

comment by: *Bell*

The need to select appropriate standards in critical applications is agreed, however when parts are manufactured to a standard the premise is that the part meets that standard, not something less. OEMs are required to maintain controlled sources of standard parts which ensure the integrity of the part to the standard. Other entities involved in the maintenance of aircraft are also bound by the same requirements to ensure the sources of supply of standard fasteners are also trusted and reliable.

The AMC proposed by EASA goes beyond what has been accepted through CRIs and CMs and is a very complex and controversial topic. The proposed AMC will add significant burden to OEMs, Maintainers and Operators due to the increased cost related to the controls that are proposed. The changes do not meet the criteria of non-complex and non-controversial and need to be assessed in a dedicated rulemaking activity.

The changes do not meet the criteria of non-complex and non-controversial. Remove AMC1 27.607 and AMC1 29.607 from the NPA and initiate a dedicated RMT with appropriate industry involvement and conduct the appropriate cost impact analysis to ensure that impacts are properly assessed.

response

Noted

Not considered as per comment #331 (duplicated comment with GAMA).

comment

228

comment by: *Bell*



<p>response</p>	<p>The proposed AMC states that it will supplement FAA AC 29-2C & AC 29.607 when demonstrating compliance with CS 29.607. However, CS 29.607 only states requirements tied to locking features of fasteners.</p> <p>The proposed AMC far exceeds the current scope of CS 29.607. Explanations and procedures presented in the proposed AMC will be of no use while demonstrating compliance to CS 29.607 but seems rather to be intended as additional requirements or compliance demonstrations for CS 29.602, 29.603, 29.605 & 29.613.</p> <p>Partially accepted</p> <p>The text has been adapted to include CS 29.601, .602 and .603.</p>
<p>comment</p>	<p>229 comment by: <i>Bell</i></p> <p>AMC1 29.607(c)(10)</p> <p>The identification of a critical installation does not automatically require that qualified standard fasteners be used. The design assessment needs to ensure that the appropriate types and quantities of fasteners are used. The design assessment may also conclude that qualified standard fasteners are to be used, but this is not explicitly required.</p> <p>Requiring qualified standard fasteners in critical locations will add significant cost.</p> <p>Remove the expectation for fasteners used in critical installations to be qualified standard fasteners.</p>
<p>response</p>	<p>Noted</p> <p>Not considered as per comment #227 (duplicated comment with GAMA).</p>
<p>comment</p>	<p>230 comment by: <i>Bell</i></p> <p>Numbering of paragraphs is incorrect.</p>
<p>response</p>	<p>Accepted.</p> <p>If this comment relates to AMC1 a29.607 (c), the numbering has been corrected.</p>
<p>comment</p>	<p>274 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.607</p> <p><u>Justification</u></p> <p>The AMC includes several statements concerning manufacturing processes and quality of standard fasteners in the context of the type design definition. The responsibility from the type design perspective is to ensure the design complies with the applicable certification basis and is safe. When standard fasteners are selected they need to be appropriate for the application including the intended environment, and per 29.601 take into account in-service experience.</p>



The basic assumption during design and showing of compliance is that the fastener meets its specification and based on that is appropriate for the intended application. Design practices and assessment of potential hazards are also to be assessed to ensure the appropriate number of fasteners are used and the appropriate amount of redundancy is provided.

Manufacturing and quality of standard fasteners is not a TC Applicant/Holder responsibility. The manufacturing and quality of a fastener is the responsibility of the Production or Maintenance Organization to ensure the fastener is manufactured in accordance with the standard. Oversight of these organizations to ensure this is the responsibility of the applicable State or Agency.

Proposed resolution

The proposed AMC must separate the responsibilities of the TC Applicant/Holder from the Production Organization or Maintenance Organization.

The TC Applicant and TC Holder are responsible for compliance based on CS-29 and are not responsible to ensure that standard fasteners are manufactured correctly.

The Production or Manufacturing organization are responsible to ensure that all parts, including standard fasteners are manufactured in accordance with the applicable specifications.

response

Not Accepted

In general, standard fasteners may not be produced by production organisations as per Part 21. Consequently, there may be no production organisation ensuring an adequate quality control.

Maintenance organisations might be capable of identifying obvious damages on standard fasteners, but they cannot identify all parameters defined in the standard for the fastener.

Consequently, the design organisation has to ensure that the parts used in their design do meet the minimum specifications considered during certification.

In addition, 29.601 requires that the rotorcraft may have no design features or details that experience has shown to be hazardous or unreliable and there has been some negative in-service experience of the use of standard parts in critical installations. It is the TC or STC applicant's responsibility, in accordance with 21A.20, to ensure that the reliability of a standard part or any other part specified in the design is compatible with the design objectives.

comment

276

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

AMC1 29.607

Justification



The proposed text is based on EASA CM-S-003 - Application of Standard Fasteners (nuts and bolts) , which refers to CS29 601, 602, 603 and 607. The purpose of the CM was to provide DAHs with guidance on appropriate actions to ensure appropriate utilisation of Standard Fasteners in their designs, and help them to instruct POAs and MOAs as necessary for CAW assurance purposes. Also, it was intended to provide means by which unsafe conditions related to the use in design of Standard Fasteners can be prevented. The CM reminds the obligations of the POA with respect to standard parts GM No. 2 to 21.A.139(a) and GM to 21.A.133(a).

Except by reference to the Regulation Title of CS 29.607, Fasteners, the purpose of this AMC is not to manage dual locking device issue, but POA and MOA issue regarding Standard fasteners.

Proposed resolution

EASA to consider:

a) changing the title of the AMC and not relate it to 29.607 exclusively, as it is misleading regarding its objective.

b) rewording the first paragraph to emphasize this AMC should be used when demonstrating compliance with CS 29.601, 602, 603 and 607, as proposed:

"This AMC supplements FGM No. 2 to 21.A.139(a) and GM to 21.A.133(a) and should be used when demonstrating compliance with CS 29.601, 602, 603, 607."

response

Partially accepted

The text has been adapted to include CS 29.601, .602 and .603.

comment

278

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

AMC1 29.607

Justification

The proposed AMC states that it will supplement FAA AC 29-1B & AC 29.607 when demonstrating compliance with CS 29.607. However, CS 29.607 only states requirements tied to locking features of fasteners.

Proposed resolution

EASA to clarify the scope of AMC1 29.607 and whether it is intended as additional requirements or compliance demonstrations for CS 29.602, 603, 605, and 613.

response

Partially accepted.

See the response to comment #276.

comment

280

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

AMC1 29.607 (c) (12)



response	<p><u>Justification</u> The responsibility to ensure standard fasteners are manufactured properly and conform to the applicable design are the responsibility of the Production or Maintenance organization not the TC Applicant. Adding requirement for the manufacture of standard fasteners in the type design is redundant.</p> <p><u>Proposed resolution</u> Remove the need for the TC Applicant to include requirements for conformity, acceptance, storage of standard fasteners.</p> <p>Not accepted See the response to comment #274.</p>
comment	<p>331 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.607</p> <p><u>Justification</u> The need to select appropriate standards in critical applications is agreed, however when parts are manufactured to a standard the premise is that the part meets that standard, not something less. OEMs are required to maintain controlled sources of standard parts which ensure the integrity of the part to the standard. Other entities involved in the maintenance of aircraft are also bound by the same requirements to ensure the sources of supply of standard fasteners are also trusted and reliable.</p> <p>The AMC proposed by EASA goes beyond what has been accepted through CRIs and CMs and is a very complex and controversial topic. The proposed AMC will add significant burden to OEMs, Maintainers and Operators due to the increased cost related to the controls that are proposed. The changes do not meet the criteria of non-complex and non-controversial and need to be assessed in a dedicated rulemaking activity.</p> <p><u>Proposed resolution</u> The changes do not meet the criteria of non-complex and non-controversial. Remove AMC1 27.607 and AMC1 29.607 from the NPA and initiate a dedicated RMT with appropriate industry involvement and conduct the appropriate cost impact analysis to ensure that impacts are properly assessed.</p> <p>Not accepted</p> <p>The proposed AMC is based on CM-S-003, which was publicly consulted and based on several CRIs raised during certification projects.</p> <p>In addition, see the response to comment #274.</p>
comment	<p>354 comment by: <i>Andre Luis Garcia</i></p> <p>AMC1 29.607 (c)</p> <p><u>Justification</u> Numbering issue: Topics in the paragraph (c) starts with (8), etc.</p>

response	<u>Proposed resolution</u> Numbering issue: Topics in the paragraph (c) starts with (8), etc.
	Accepted. The numbering has been corrected.

AMC1 27.610 Lightning and static electricity protection

p. 78

comment	74	comment by: AIRBUS HELICOPTERS
	<p>About the 4th paragraph of AMC1 27.610 (c) : "<i>Each part the failure which implies potential catastrophic consequences and that is exposed to damage under lightning conditions, should be subject to further evaluation which includes:</i>"</p> <p>Typo : Airbus Helicopters suggests adding the term "<i>whose</i>" in bold and underlined as follows :</p> <p>AH PROPOSED TEXT : <i>Each part, <u>whose</u> failure implies potential catastrophic consequences and that is exposed to damage under lightning conditions, should be subject to further evaluation which includes:</i></p>	
response	<p>Noted</p> <p>Not considered as per comment #281 (duplicated comment with GAMA).</p>	
comment	76	comment by: AIRBUS HELICOPTERS
	<p>About AMC1 27.610 (c) "<i>Explanation</i>" :</p> <p>Airbus Helicopters suggests completing AMC1 27.610 (c) as proposed below in bold and underlined :</p> <p>AH PROPOSED TEXT : "[...]"</p> <p><i>Each part, <u>whose</u> failure implies potential catastrophic consequences and that is exposed to damage under lightning conditions, should be subject to further evaluation which includes:</i></p> <p style="padding-left: 40px;">(1) <i>the nature and extent of the lightning damage (threat assessment, damage detectability, etc.);</i></p> <p style="padding-left: 40px;">(2) <i>when found necessary, the demonstration that the part still ensures its function up to a safe landing;</i></p> <p style="padding-left: 40px;">(3) <i>when found necessary, a static residual strength capability supported by analysis and/or test;</i></p> <p style="padding-left: 40px;">(4) <i>when found necessary, a fatigue evaluation of a part with lightning damage for the demonstration of the exposure time before detection.</i></p> <p><i>The airworthiness instruction requested after lightning strike (flight manual and maintenance instructions, etc.) should be consistent with the functional, static and fatigue evaluations of the damage consequences (considered to be a partial failure)."</i></p>	



response	<p>AH JUSTIFICATION :</p> <p>In AMC1 27.610 (c)(3) and the following sentence, fatigue evaluation is not sufficient to demonstrate the safe end-of-flight and landing. The expected damage tolerance evaluation / residual strength substantiation should not be limited to fatigue, but should also address other potential failure modes, when relevant: e.g. the ability of a spherical plain bearing, a rolling bearing, ... to ensure its function till the end of the flight, despite potential damages resulting from a LDE (not a fatigue issue but a wear-related one, more related to CMR than to CS 27.571/CS 27.573).</p> <p>Noted</p> <p>Not considered as per comment #281 (duplicated comment with GAMA).</p>
comment	<p>281 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.610 (c)(3)</p> <p><u>Justification</u></p> <p>In (c)(3) and the following sentence, fatigue evaluation is not sufficient to demonstrate the safe end-of-flight and landing. The expected damage tolerance evaluation / residual strength substantiation should not be limited to fatigue, but should also address other potential failure modes, when relevant: e.g. the ability of a spherical plain bearing, a rolling bearing, ... to ensure its function till the end of the flight, despite potential damages resulting from a LDE (not a fatigue issue but a wear-related one, more related to CMR than to 571/573).</p> <p><u>Proposed resolution</u></p> <p>EASA to complete (c)(3) Explanation as proposed below:</p> <p>[...]</p> <p>Each part the failure of which implies potential catastrophic consequences and that is exposed to damage under lightning conditions, should be subject to further evaluation which includes:</p> <p>(1) the nature and extent of the lightning damage (threat assessment, damage detectability, etc.);</p> <p>(2) when found necessary, the demonstration that the part still ensures its function up to a safe landing;</p> <p>(3) when found necessary, a static residual strength capability supported by analysis and/or test;</p> <p>(4) when found necessary, a fatigue evaluation of a part with lightning damage for the demonstration of the exposure time before detection.]</p> <p>Complete as proposed below:</p> <p>"The airworthiness instruction requested after lightning strike (flight manual and maintenance instructions, etc.) should be consistent with the functional, static and fatigue evaluations of the damage consequences (considered to be a partial failure)"</p>
response	<p>Partially accepted.</p>



EASA agrees to add the **functional** criteria. However, it is not relevant to include 'when found necessary'.

The functionality and the static residual strength demonstration should be performed systematically.

A fatigue evaluation should be performed on each affected part of flight structure, the failure of which implies potential catastrophic consequences when subject to fatigue.

AMC1 29.610 Lightning and static electricity protection

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comment

75

comment by: AIRBUS HELICOPTERS

About the 4th paragraph of AMC1 29.610 (c) : "*Each part the failure which implies potential catastrophic consequences and that is exposed to damage under lightning conditions, should be subject to further evaluation which includes:*"

Typo : Airbus Helicopters suggests adding the term "*whose*" in bold and underlined as follows :

AH PROPOSED TEXT :

Each part, whose failure implies potential catastrophic consequences and that is exposed to damage under lightning conditions, should be subject to further evaluation which includes:

response

Noted

Not considered as per comment #282 (duplicated comment with GAMA).

comment

77

comment by: AIRBUS HELICOPTERS

About AMC1 29.610 (c) "*Explanation*" :

Airbus Helicopters suggests completing AMC1 29.610 (c) as proposed below in bold and underlined :

AH PROPOSED TEXT :

"[...]

Each part, whose failure implies potential catastrophic consequences and that is exposed to damage under lightning conditions, should be subject to further evaluation which includes:

(1) the nature and extent of the lightning damage (threat assessment, damage detectability, etc.);

*(2) **when found necessary, the demonstration that the part still ensures its function up to a safe landing;***

*(3) **when found necessary, a static residual strength capability supported by analysis and/or test;***

(4) when found necessary, a fatigue evaluation of a part with lightning damage for the demonstration of the exposure time before detection.

*The airworthiness instruction requested after lightning strike (flight manual and maintenance instructions, etc.) should be consistent with the **functional**, static and fatigue evaluations of the damage **consequences** (considered to be a partial failure)."*



response	<p>AH JUSTIFICATION :</p> <p>In AMC1 29.610 (c)(3) and the following sentence, fatigue evaluation is not sufficient to demonstrate the safe end-of-flight and landing. The expected damage tolerance evaluation / residual strength substantiation should not be limited to fatigue, but should also address other potential failure modes, when relevant: e.g. the ability of a spherical plain bearing, a rolling bearing, ... to ensure its function till the end of the flight, despite potential damages resulting from a LDE (not a fatigue issue but a wear-related one, more related to CMR than to CS 29.571/CS 29.573).</p> <p>Noted</p> <p>Not considered as per comment #282 (duplicated comment with GAMA).</p>
comment	<p>282 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.610 (c)(3)</p> <p><u>Justification</u></p> <p>In (c)(3) and the following sentence, fatigue evaluation is not sufficient to demonstrate the safe end-of-flight and landing. The expected damage tolerance evaluation / residual strength substantiation should not be limited to fatigue, but should also address other potential failure modes, when relevant: e.g. the ability of a spherical plain bearing, a rolling bearing, ... to ensure its function till the end of the flight, despite potential damages resulting from a LDE (not a fatigue issue but a wear-related one, more related to CMR than to 571/573).</p> <p><u>Proposed resolution</u></p> <p>EASA to complete (c)(3) Explanation as proposed below:</p> <p>[...]</p> <p>Each part the failure of which implies potential catastrophic consequences and that is exposed to damage under lightning conditions, should be subject to further evaluation which includes:</p> <p>(1) the nature and extent of the lightning damage (threat assessment, damage detectability, etc.);</p> <p>(2) when found necessary, the demonstration that the part still ensures its function up to a safe landing;</p> <p>(3) when found necessary, a static residual strength capability supported by analysis and/or test;</p> <p>(4) when found necessary, a fatigue evaluation of a part with lightning damage for the demonstration of the exposure time before detection.]</p> <p>Complete as proposed below:</p> <p>"The airworthiness instruction requested after lightning strike (flight manual and maintenance instructions, etc.) should be consistent with the functional, static and fatigue evaluations of the damage consequences (considered to be a partial failure)"</p>
response	<p>Partially accepted.</p>



EASA agrees to add the **functional** criteria. However, it is not relevant to include 'when found necessary'.

The functionality and the static residual strength demonstration should be performed systematically.

A fatigue evaluation should be performed on each affected part of flight structure, the failure of which implies potential catastrophic consequences when subject to fatigue (a fatigue evaluation should be performed if the part is PSE classified).

CS 27.309 Design limitations

p. 80

comment

78

comment by: AIRBUS HELICOPTERS

About CS 27.309 (h) : "*The maximum and minimum density altitude and temperatures.*"

AH COMMENT :

Airbus Helicopters suggests a clarification of the applicability of CS 27.571 with regard to the environmental conditions ("altitude only" or "temperature and altitude")

AH JUSTIFICATION :

This clarification is requested because of an inconsistency between CS 27.309 and CS 27.571.

Indeed, CS 27.571 (a)(3) refers to 27.309 as follows :

"(3) In-flight measurement must be included in determining the following:

(i) Loads or stresses in all critical conditions throughout the range of limitations in CS 27.309, except that manoeuvring load factors need not exceed the maximum values expected in operation.

(ii) The effect of altitude upon these loads or stresses."

whereas CS 27.309 (h) addresses temperature in addition to the altitude with the wording "*maximum and minimum density altitude and temperatures.*"

response

Noted

Not considered as per comment #283 (duplicated comment with GAMA).

comment

283

comment by: General Aviation Manufacturers Association (GAMA)

CS 27.309

Justification

The proposed text appears to highlight an inconsistency between CS 27.309/29.309 and 27.571/29.571

CS 27.571/ 29.571 refers to CS 27.309/29.309 :

"In-flight measurements to determine the fatigue loads or stresses for the PSEs identified in sub-paragraph (d) in all critical conditions throughout the range of design limitations required in CS 29.309 (including altitude effects)",



	<p>wheras</p> <p>CS 27.309/29.309 (h) "maximum and minimum density altitude and temperatures."</p> <p><u>Proposed resolution</u></p> <p>EASA to clarify the applicability to CS 27.571/29.571 with reference to environmental conditions ("temperature only" or "temperature and altitude")</p>
response	<p>Partially Accepted.</p> <p>This inconsistency is noted and agreed. However, it is clear that both temperature and altitude effects must be considered in the 27/29.571 compliance demonstration. For example, AC 27 MG 11 states ‘The flight load measurement program shall demonstrate maximum and minimum loads for the <u>entire flight envelope</u>.’ ‘The <u>effects of temperature</u> and of <u>high altitude operation or altitude cycling</u> should be investigated’ ‘In addition attention should be paid to the <u>influence of temperature</u> through the whole range certified.’</p> <p>An update to CS27/29.571 will be considered during the next regular update, and may be proposed for public consultation.</p>

AMC1 27.337 Limit manoeuvring load factor	p. 80
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comment	<p>80 comment by: AIRBUS HELICOPTERS</p> <p>About the first sentence of AMC1 27.337 : "<i>This AMC supplements FAA AC 27-1B, § AC 27.337 and should be used in conjunction with that AC when demonstrating compliance with CS 27.337.</i>"</p> <p>AH suggests the following change in bold and underlined in this first sentence as follows :</p> <p><u>AH PROPOSED TEXT :</u> "<i>This AMC supplements FAA AC 27-1B, § AC 27.337 and should be used in conjunction with that AC when demonstrating compliance with CS 27.337 <u>for positive load factor.</u></i>"</p> <p><u>AH JUSTIFICATION :</u> Clarifications are needed on applicability of this AMC to positive load factor only. Confirm applicability to the maximum lift only because the scope is not clear when this AMC should be used in conjunction with the FAA AC. Other remark : inconsistency between AC and AMC</p>
response	<p>Noted</p> <p>Not considered as per comment #284 (duplicated comment with GAMA).</p>

comment	<p>82 comment by: AIRBUS HELICOPTERS</p>
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About the second sentence of AMC1 27.337 : "In accordance with CS 27.337, the rotorcraft may be substantiated to a maximum positive load factor less than +3.5 (but not less than 2.0) provided that the probability of being exceeded is shown to be extremely remote."

Airbus Helicopters suggests not changing the existing CS 27.337, otherwise for preventing any further CRIs, AH suggests modifying the sentence in bold and underlined as follows :

AH PROPOSED TEXT : "In accordance with CS 27.337, the rotorcraft may be substantiated to the maximum load factors **which are achievable by flight test crew as the boundary are considered extremely remote.**"

AH JUSTIFICATION :

There are no safety issue in cold or hot conditions. There are no improvement in design safety but loss of time and adverse economical impact. This is insufficient to avoid CRIs because there are no precisions added on the maximum load factor.

An analytical study and flight demonstration are required to define the maximum load factor.

- Simulation can be used to support the determination of the maximum achievable load factor. During critical aggressive emergency avoidance manoeuvres, pilot controls correction must be applied in order to bring the helicopter back to a stabilized state. Therefore, it will not lead to more severe load factor depending on the air density
- Moreover, flight crew indicates that an emergency manoeuvre at iso-IAS is performed using the same trajectory whatever the atmospheric conditions. Consequently, the accelerations and the load factor during the manoeuvre will be the same whatever the atmospheric condition.

response Noted

Not considered as per comment #287 (duplicated comment with GAMA).

comment

284

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

AMC1 27.337

Justification

Clarifications seem to be needed on the applicability to positive load factor only. EASA should precise if it is applicable only to maximum lift. Text is not clear as it should be used in conjunction to AC. Furthermore, there is an inconsistency between AC and AMC.

Proposed resolution

GAMA would like to suggest:

This AMC supplements FAA AC 27-1B, § AC 27.337 and should be used in conjunction with that AC when demonstrating compliance with CS 27.337 for positive load factor.



response	<p>Partially accepted.</p> <p>This AMC supplements FAA AC 27-1B, § AC 27.337 and should be used in conjunction with that AC when demonstrating compliance with CS 27.337 for determining the positive limit manoeuvring load factor.</p>
comment	<p>287 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.337</p> <p><u>Justification</u></p> <p>The AMC1 27.337 seems to not improve design security but rather increase its time and cost, and is still insufficient to avoid CRI's due to the lack of precision on the maximum load factor. There are no safety issues in cold or hot conditions.</p> <p>An analytical study and flight demonstration are required to define the maximum load factor.</p> <ul style="list-style-type: none"> • Simulation can be used to support the determination of the maximum achievable load factor. During critical aggressive emergency avoidance manoeuvres pilot controls correction must be applied in order to bring the helicopter back to a stabilized state. Therefore, it will not lead to more severe load factor depending on the air density • Moreover, flight crew indicates that an emergency manoeuvre at iso-IAS is performed using the same trajectory whatever the atmospheric conditions. Consequently, the accelerations and the load factor during the manoeuvre will be the same whatever the atmospheric condition. <p><u>Proposed resolution</u></p> <p>EASA to consider not changing the existing CS 27.337 and related AMCs. Alternatively, in order to prevent any further CRIs, GAMA would suggest replacing the paragraph:</p> <p>"In accordance with CS 27.337, the rotorcraft may be substantiated to a maximum positive load factor less than +3.5 (but not less than 2.0) provided that the probability of being exceeded is shown to be extremely remote."</p> <p>with</p> <p>"In accordance with CS 27.337, the rotorcraft may be substantiated to the maximum load factors which are achievable by flight test crew as the boundary are considered extremely remote."</p>
response	<p>Not accepted.</p> <p>The maximum load factor achieved during flight test does not represent the limit load capability of the rotorcraft to be used for structural design.</p> <p>It represents the maximum load factor that the pilot could achieve in the conditions flown during the test, not taking into account other constraints such as piloting technique, density altitude, etc. The limit load factor should be 3.5g or a lower value as limited by the design constraints of the rotorcraft. Flight test may be used to support this definition, but not to directly define the value.</p>

comment	<p>79 comment by: AIRBUS HELICOPTERS</p> <p>About CS 29.309 (h) : "The maximum and minimum density altitude and temperatures."</p> <p><u>AH COMMENT :</u> Airbus Helicopters suggests a clarification of the applicability of CS 29.571 with regard to the environmental conditions ("altitude only" or "temperature and altitude")</p> <p><u>AH JUSTIFICATION :</u> This clarification is requested because of an inconsistency between CS 29.309 and CS 29.571. Indeed, CS 29.571 (e)(1) refers to 29.309 as follows : "(e) Each fatigue tolerance evaluation must include:</p> <ol style="list-style-type: none"> (1) In-flight measurements to determine the fatigue loads or stresses for the PSEs identified in sub-paragraph (d) (2) in all critical conditions throughout the range of design limitations required in CS 29.309 (including altitude effects),except that manoeuvring load factors need not exceed the maximum values expected in operations." <p>whereas CS 29.309 (h) addresses temperature in addition to the altitude with the wording "maximum and minimum density altitude and temperatures."</p>
response	<p>Noted</p> <p>Not considered as per comment #286 (duplicated comment with GAMA).</p>

comment	<p>286 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>CS 29.309</p> <p><u>Justification</u> The proposed text appears to highlight an inconsistency between CS 27.309/29.309 and 27.571/29.571</p> <p>CS 27.571/ 29.571 refers to CS 27.309/29.309 :</p> <p>"In-flight measurements to determine the fatigue loads or stresses for the PSEs identified in sub-paragraph (d) in all critical conditions throughout the range of design limitations required in CS 29.309 (including altitude effects)",</p> <p>wheras</p> <p>CS 27.309/29.309 (h) "maximum and minimum density altitude and temperatures."</p> <p><u>Proposed resolution</u></p>
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	EASA to clarify the applicability to CS 27.571/29.571 with reference to environmental conditions ("temperature only" or "temperature and altitude")
response	<p>Partially accepted.</p> <p>This inconsistency is noted and agreed. However, it is clear that both temperature and altitude effects must be considered in the 27/29.571 compliance demonstration. For example, AC 27 MG 11 states 'The flight load measurement program shall demonstrate maximum and minimum loads for the <u>entire flight envelope</u>.' 'The <u>effects of temperature</u> and of <u>high altitude operation or altitude cycling</u> should be investigated' 'In addition attention should be paid to the <u>influence of temperature</u> through the whole range certified.'</p> <p>An update to CS 27/29.571 will be considered during the next regular update, and may be proposed for public consultation.</p>

AMC1 29.337 Limit manoeuvring load factor
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p. 81

comment	<p>81 comment by: AIRBUS HELICOPTERS</p> <p>About the first sentence of AMC1 29.337 : "<i>This AMC supplements FAA AC 29-2C, § AC 29.337 and should be used in conjunction with that AC when demonstrating compliance with CS 29.337.</i>"</p> <p>AH suggests the following change in bold and underlined in this first sentence as follows :</p> <p><u>AH PROPOSED TEXT :</u> "<i>This AMC supplements FAA AC 29-2C, § AC 29.337 and should be used in conjunction with that AC when demonstrating compliance with CS 29.337 <u>for positive load factor.</u></i>"</p> <p><u>AH JUSTIFICATION :</u> Clarifications are needed on applicability of this AMC to positive load factor only. Confirm applicability to the maximum lift only because the scope is not clear when this AMC should be used in conjunction with the FAA AC. Other remark : inconsistency between AC and AMC</p>
response	<p>Noted</p> <p>Not considered as per comment #285 (duplicated comment with GAMA).</p>
comment	<p>83 comment by: AIRBUS HELICOPTERS</p> <p>About the second sentence of AMC1 29.337 : "<i>In accordance with CS 29.337, the rotorcraft may be substantiated to a maximum positive load factor less than +3.5 (but not less than 2.0) provided that the probability of being exceeded is shown to be extremely remote.</i>"</p>



Airbus Helicopters suggests not changing the existing CS 29.337, otherwise for preventing any further CRIs, AH suggests modifying the sentence in bold and underlined as follows :

AH PROPOSED TEXT : "*In accordance with CS 29.337, the rotorcraft may be substantiated to the maximum load factors **which are achievable by flight test crew as the boundary are considered extremely remote.***"

AH JUSTIFICATION :

There are no safety issue in cold or hot conditions. There are no improvement in design safety but loss of time and adverse economical impact. This is insufficient to avoid CRIs because there are no precisions added on the maximum load factor.

An analytical study and flight demonstration are required to define the maximum load factor.

- Simulation can be used to support the determination of the maximum achievable load factor. During critical aggressive emergency avoidance manoeuvres, pilot controls correction must be applied in order to bring the helicopter back to a stabilized state. Therefore, it will not lead to more severe load factor depending on the air density
- Moreover, flight crew indicates that an emergency manoeuvre at iso-IAS is performed using the same trajectory whatever the atmospheric conditions. Consequently, the accelerations and the load factor during the manoeuvre will be the same whatever the atmospheric condition.

response

Noted

Not considered as per comment #288 (duplicated comment with GAMA).

comment

285

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

AMC1 29.337

Justification

Clarifications seem to be needed on the applicability to positive load factor only. EASA should precise if it is applicable only to maximum lift. Text is not clear as it should be used in conjunction to AC. Furthermore, there is an inconsistency between AC and AMC.

Proposed resolution

GAMA would like to suggest:

This AMC supplements FAA AC 29-1B, § AC 29.337 and should be used in conjunction with that AC when demonstrating compliance with CS 29.337 for positive load factor.

response

Partially accepted.



This AMC supplements FAA AC 29-1B, § AC 29.337 and should be used in conjunction with that AC when demonstrating compliance with CS 29.337 for determining the positive limit manoeuvring load factor.

comment

288

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

AMC1 29.337

Justification

The AMC1 29.337 seems to not improve design security but rather increase its time and cost, and is still insufficient to avoid CRI's due to the lack of precision on the maximum load factor. There are no safety issues in cold or hot conditions.

An analytical study and flight demonstration are required to define the maximum load factor.

- Simulation can be used to support the determination of the maximum achievable load factor. During critical aggressive emergency avoidance manoeuvres pilot controls correction must be applied in order to bring the helicopter back to a stabilized state. Therefore, it will not lead to more severe load factor depending on the air density
- Moreover, flight crew indicates that an emergency manoeuvre at iso-IAS is performed using the same trajectory whatever the atmospheric conditions. Consequently, the accelerations and the load factor during the manoeuvre will be the same whatever the atmospheric condition.

Proposed resolution

EASA to consider not changing the existing CS 29.337 and related AMCs. Alternatively, in order to prevent any further CRIs, GAMA would suggest replacing the paragraph:

"In accordance with CS 29.337, the rotorcraft may be substantiated to a maximum positive load factor less than +3.5 (but not less than 2.0) provided that the probability of being exceeded is shown to be extremely remote."

with

"In accordance with CS 29.337, the rotorcraft may be substantiated to the maximum load factors which are achievable by flight test crew as the boundary are considered extremely remote."

response

Not accepted.

The maximum load factor achieved during flight test does not represent the limit load capability of the rotorcraft to be used for structural design. It represents the maximum load factor that the pilot could achieve in the conditions flown during the test, not taking into account other constraints such as piloting technique, density altitude, etc. The limit load factor should be 3.5g or a lower value as limited by the design constraints of the rotorcraft. Flight test may be used to support this definition, but not to directly define the value.

Please note that the NPA proposed additional AMC to 29.337 and did not include modification to the requirement itself.



AMC1 27.613 Material strength properties and design values

p. 83

comment	<p>84 comment by: AIRBUS HELICOPTERS</p> <p>About the last sentence of AMC1 27.613 (d) : " - any existing, and potentially related, ICA, e.g. existing Ads, etc."</p> <p>Editorial : Airbus Helicopters suggests replacing "Ads" by "ADs"</p> <p>AH PROPOSED TEXT : " - any existing, and potentially related, ICA, e.g. existing ADs, etc."</p>
response	<p>Accepted ' - any existing, and potentially related, ICA, e.g. existing ADs, etc.'</p>
comment	<p>113 comment by: Garmin International</p> <p>AMC1 27.613 (a) 83 of 112</p> <p>Paragraph 3, Bullet item 3, typo (e.g. core thermal pre-forming)</p>
response	<p>Accepted (e.g. core thermal pre-forming)</p>
comment	<p>289 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>AMC1 27.613 (b)</p> <p><u>Justification</u> AMC1 27.613 (b) states that manufacturing defects up to limit of acceptability and impact damages should be considered in determining the static allowables required in CS 27.613. Consideration of defects and damages is a damage tolerance requirement warranted for composite PSEs by CS 27.573. Imposing damage tolerance requirements to non-PSE structure is outside the scope of CS 27.573 & CS 27.613.</p> <p><u>Proposed resolution</u> It must be clarified that consideration for manufacturing defects up to limit of acceptability and impact damages should be considered in determining static allowables to be used for PSEs, however non-PSEs should be exempt from this requirement.</p>
response	<p>Partially accepted Minimum quality should be considered for the definition of design allowables for all structural parts, not only PSEs. As stated in AMC 20-29, Section 7 Proof of Structure - Static 'The structural static strength substantiation of a composite design should consider all critical load cases and associated failure modes. It should also include effects of environment (including residual stresses induced during the fabrication process), material and process variability, <u>non-detectable defects or any defects that are allowed by the quality control, manufacturing acceptance criteria, and service damage allowed in maintenance documents of the end product.'</u></p>



Impact damages should only be considered for PSEs as part of this threat assessment to show compliance with CS 27.573.

Text reworded: In determining the above properties, the effect due to humidity uptake, highest and lowest temperature expected in service, manufacturing defects up to limit of acceptability and allowable in-service damage defined in maintenance documents, if any, should be considered. For PSEs only, impact damages should also be assessed in accordance with CS 27.573.

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

AMC1 27.613 (c) (d)

Justification

AMC1 27/9.613(c) & (d) are directly linked with CS 27.573 requirements (damage tolerance, residual strength and ICAs) and have no ties with CS 27.613 Material Strength Properties and Design Values.

Proposed resolution

If AC 27.573 is deemed insufficient to deal with Damage Tolerance of PSE composite sandwich panels, the content from AMC1 27.613(c) & (d) should be added to AMC 27.573 in an effort to centralize all relevant guidance material tied to damage tolerance of composite structure.

response Not Accepted.
This AMC material supplements the AC 27.573 guidance. It is considered appropriate to keep all guidance for composite sandwich panels together and refer to other requirements and guidance material as appropriate.

comment 355 comment by: *Andre Luis Garcia TCCA*

AMC1 27.613(a)

To be more emphatic in the rule: “As part of the process qualification, destructive and non-destructive inspection (NDI) should be conducted to determine conformity to specified design requirements and check the suitability of the resulting product by assessing features such as: ...”

PROPOSED TEXT :

“As part of the process qualification, destructive and non-destructive inspection (NDI) must be conducted to determine conformity to specified design requirements and check the suitability of the resulting product by assessing features such as: ...”

response Not Accepted.
As this is AMC material, the word ‘should’ is appropriate.

comment 356 comment by: *Andre Luis Garcia TCCA*

AMC1 27.613(b)



response	<p>To be more emphatic in the rule: “Because of the peculiarity of the sandwich panel construction, the material properties should be established on a specimen that is fully representative of the panel construction in terms of skin, core material and curing cycle.”</p> <p>PROPOSED TEXT : “Because of the peculiarity of the sandwich panel construction, the material properties must be established on a specimen that is fully representative of the panel construction in terms of skin, core material and curing cycle.”</p> <p>Not Accepted. As this is AMC material, the word ‘should’ is appropriate.</p>
comment	<p>357 comment by: Andre Luis Garcia TCCA</p> <p>AMC1 27.613(b)</p> <p>To be more emphatic in the rule: “The validity of the engineering formula used to establish analytical design allowables should be always verified by dedicated experimental activity in order to assess the effects of the manufacturing process (e.g. curing..”</p> <p>PROPOSED TEXT : “The validity of the engineering formula used to establish analytical design allowables must be always verified by dedicated experimental activity in order to assess the effects of the manufacturing process (e.g. curing..”</p>
response	<p>Not Accepted. As this is AMC material, the word ‘should’ is appropriate.</p>
comment	<p>358 comment by: Andre Luis Garcia TCCA</p> <p>AMC1 27.613(c)(2)</p> <p>To identify the right definition in the loading: “The part should be sized to sustain limit load (LL) with extensive damage or degradation of the most critical skin to core bond between...</p> <p>PROPOSED TEXT : To use the right term for residual strength loading (it is a subset of limit load) : “: “The part should be sized to sustain residual strength loading with extensive damage or degradation of the most critical skin to core bond between...</p>
response	<p>Partially accepted. The residual strength requirement with damage is defined in CS 27.573(d)(4)(ii)(B). The minimum required residual strength is limit load. The text is reworded for clarity: ‘The part should be sized to sustain the required residual strength, in accordance with CS 27.573(d)(4)(ii)(B), with extensive damage or degradation of the most critical skin to core bond between available arrestment features.’</p>

comment	<p>85 comment by: AIRBUS HELICOPTERS</p> <p>About the last sentence of AMC1 29.613 (d) : " - any existing, and potentially related, ICA, e.g. existing Ads, etc."</p> <p>Editorial : Airbus Helicopters suggests replacing "Ads" by "ADs"</p> <p>AH PROPOSED TEXT : " - any existing, and potentially related, ICA, e.g. existing ADs, etc."</p>
response	<p>Accepted</p> <p>' - any existing, and potentially related, ICA, e.g. existing ADs, etc.'</p>
comment	<p>86 comment by: AIRBUS HELICOPTERS</p> <ul style="list-style-type: none"> • About the first sentence of AMC1 29.613 (c)(1) : "Further to good processing, and when meeting the damage tolerance and fatigue evaluation of composite rotorcraft structures requirements of CS 27.573, the applicant should clearly demonstrate that a robust structure has been produced by showing:" • and about the last sentence of AMC1 29.613 (c)(1) on page 87 : "The recommendations for threat assessment and blunt impact evaluation are also addressed in AC 27.573." <p>AH PROPOSED TEXT : Typo : In the above mentioned sentences, replace "CS 27.573" by "CS 29.573" and "AC 27.573" by "AC 29.573"</p>
response	<p>Accepted</p> <p>The typos have been corrected.</p>
comment	<p>290 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>AMC1 29.613 (b)</p> <p><u>Justification</u> AMC1 29.613 (b) states that manufacturing defects up to limit of acceptability and impact damages should be considered in determining the static allowables required in CS 29.613. Consideration of defects and damages is a damage tolerance requirement warranted for composite PSEs by CS 29.573. Imposing damage tolerance requirements to non-PSE structure is outside the scope of CS 29.573 & CS 29.613.</p> <p><u>Proposed resolution</u> It must be clarified that consideration for manufacturing defects up to limit of acceptability and impact damages should be considered in determining static allowables to be used for PSEs, however non-PSEs should be exempt from this requirement.</p>
response	<p>Partially accepted</p>

Minimum quality should be considered for the definition of design allowables for all structural parts, not only PSEs. As stated in AMC 20-29, Section 7 Proof of Structure - Static 'The structural static strength substantiation of a composite design should consider all critical load cases and associated failure modes. It should also include effects of environment (including residual stresses induced during the fabrication process), material and process variability, non-detectable defects or any defects that are allowed by the quality control, manufacturing acceptance criteria, and service damage allowed in maintenance documents of the end product.'

Impact damages should only be considered for PSEs as part of this threat assessment to show compliance with CS 29.573.

Text reworded: In determining the above properties, the effect due to humidity uptake, highest and lowest temperature expected in service, manufacturing defects up to limit of acceptability and allowable in-service damage defined in maintenance documents, if any, should be considered. For PSEs, impact damages should also be assessed in accordance with CS 29.573.

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

AMC1 29.613 (c) (d)

Justification

AMC1 29.613(c) & (d) are directly linked with CS 29.573 requirements (damage tolerance, residual strength and ICAs) and have no ties with CS 29.613 Material Strength Properties and Design Values.

Proposed resolution

If AC 29.573 is deemed insufficient to deal with Damage Tolerance of PSE composite sandwich panels, the content from AMC1 29.613(c) & (d) should be added to AMC 29.573 in an effort to centralize all relevant guidance material tied to damage tolerance of composite structure.

response Not Accepted.
This AMC material supplements the AC 29.573 guidance. It is considered appropriate to keep all guidance for composite sandwich panels together and refer to other requirements and guidance material as appropriate.

comment 359 comment by: TCCA

AMC1 29.613(a)

To be more emphatic in the rule: "As part of the process qualification, destructive and non-destructive inspection (NDI) should be conducted to determine.."

PROPOSED TEXT :

"As part of the process qualification, destructive and non-destructive inspection (NDI) must be conducted to determine.."

response Not Accepted.
As this is AMC material, the word 'should' is appropriate.



comment	360	comment by: TCCA
	<p>AMC1 29.613(b)</p> <p>To be more emphatic in the rule: “The validity of the engineering formula used to establish analytical design allowables should be always verified by dedicated experimental activity in order to assess the effects of the manufacturing process (e.g. curing..”</p> <p>PROPOSED TEXT :</p> <p>“The validity of the engineering formula used to establish analytical design allowables must be always verified by dedicated experimental activity in order to assess the effects of the manufacturing process (e.g. curing..”</p>	
response	<p>Not Accepted.</p> <p>As this is AMC material, the word ‘should’ is appropriate.</p>	

comment	361	comment by: TCCA
	<p>AMC1 29.613(c)(2)</p> <p>To identify the right definition in the loading: “The part should be sized to sustain limit load (LL) with extensive damage or degradation of the most critical skin to core bond between...</p> <p>PROPOSED TEXT :</p> <p>To use the right term for residual strength loading (which is a subset of limit load) despite CS29.571 (f) says “...withstand design limit loads without failure. “ as manouvering loads factors should be limited as cited in CS29.571 (e) (1) : “: “The part should be sized to sustain residual strength loading with extensive damage or degradation of the most critical skin to core bond between...”</p>	
response	<p>Partially accepted.</p> <p>The residual strength requirement with damage is defined in CS 29.573(d)(4)(ii)(B). The minimum required residual strength is limit load.</p> <p>The text has been reworded for clarity:</p> <p>‘The part should be sized to sustain the required residual strength, in accordance with CS 29.573(d)(4)(ii)(B), with extensive damage or degradation of the most critical skin to core bond between available arrestment features.’</p>	

AMC1 27.1093(b)(1)(i) Induction system icing protection
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p. 88

comment	88	comment by: AIRBUS HELICOPTERS
	<p>About the first sentence of AMC1 27.1093(b)(1)(i) : "<i>This AMC is applicable to rotorcraft equipped with air intake external screens and has been developed based on in-service experience.</i>"</p> <p>Airbus Helicopters suggests to modify in bold and undelined this first sentence as follows :</p> <p>AH PROPOSED TEXT :</p>	



"This AMC is applicable to rotorcraft equipped with air intake external screens (**or any air intake that experience has shown prone to same kind of icing which may exist downstream in the engine air intake ducts or engine internal screen**) and has been developed based on in-service experience. **Whenever an existing wind tunnel test data basis exists, and similarity is demonstrated, an analysis may be an acceptable means of compliance.**"

AH JUSTIFICATION :

The search for a critical temperature is presented as specific to external screens, but is to be extended to any air intake that is not based on the water droplet centrifugation principle. For example, Inlet Barrier Filters may, in some circumstances, require the same kind of analysis. Experience / similarity approaches should be possible whenever an existing tested design is similar to the one to be certified.

response

Noted.

Not considered as per comment #299 (duplicated comment with GAMA).

comment

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

AMC1 27.1093 (b)(1)(i)

Justification

GAMA members understand the intend of this new AMC, nonetheless, further guidance is needed from EASA to develop means of testing against this requirement.

Proposed resolution

EASA to consider developing further guidance, specially in the form of GM.

response

Noted

The proposed AMC material already includes some guidance on how to search for the temperature range, where this phenomenon may exist. Based on past certification exercise, where a specific CRI was developed, it looks like that applicant has understood the test procedure. At the moment, EASA is not planning any additional guidance material. During certification exercises EASA fully supports applicants to clarify the intent of any proposed means of compliance.

comment

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

AMC1 27.1093 (b)(1)(i)

Justification

The sentence '...Engine should be run at critical power' seems to be ambiguous and could provide different interpretations.

Additionally, the concept of quick accelerations'decelerations in paragraph 14 is not understood.

Proposed resolution



response	<p>EASA to further clarify the meaning of 'critical power' in the context of the sentence in para (9) and provide a definition of 'quick accelerations/decelerations' in para (14).</p> <p>Accepted.</p> <p>The critical power could be determined following a critical point analysis (other methodologies might be acceptable) to assess the engine operability with regard to the feared events such as airflow distortion or engine ingestion. Quick accelerations / decelerations are to be understood as the maximum acceleration/deceleration rates that can be performed by a pilot during flight operation. The intent is to simulate a real-life engine behaviour which affects the flow/ice ingestion accordingly. For example, values close to one second from minimum to maximum power have been considered in the past for such testing.</p> <p>Proposed text change/amendment</p> <p><i>(...) During these tests, the engine should be run at critical power regarding the feared events in the icing conditions defined in CS-29 Appendix C depending on the claimed certification (inadvertent icing encounter or full icing certification). The critical power could be determined following a critical point analysis (other methodologies might be acceptable) to assess the engine operability with regard to the feared events such as airflow distortion or engine ice ingestion.</i></p> <p><i>Quick accelerations / decelerations are to be understood as the maximum acceleration / deceleration rates that can be performed by a pilot during flight operation. The intent is to simulate a real-life engine behaviour which affects the flow/ice ingestion accordingly. For example, values close to one second from minimum to maximum power have been considered in the past for such testing.</i></p>
comment	<p>297 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.1093 (b)(1)(i)</p> <p><u>Justification</u> Implications of shedding the ice accretion into the test engine and the consequences to the test campaign are not considered within the proposed text.</p> <p><u>Proposed resolution</u> EASA to provide guidance on the implications of shedding the ice accretion into the test engine and the consequences to the test campaign.</p>
response	<p>Noted.</p> <p>This test is not supposed to be a destructive testing. Ice sheet ingestion should not lead to any engine damage if a proper design assessment (using simulation tools or design precautions) has been conducted by the applicant prior to the test. Therefore, the risk is considered as acceptable by EASA.</p>
comment	<p>299 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p>



AMC1 27.1093 (b)(1)(i)

Justification

The search for a critical temperature is presented as specific to external screens, but is to be extended to any air intake that is not based on the water droplet centrifugation principle. For example, Inlet Barrier Filters, may, in some circumstances, require the same kind of analysis. Experience / similarity approaches should be possible whenever an existing tested design is similar to the one to be certified.

Proposed resolution

EASA to consider changing the first sentence of the AMC as follows :

"This AMC is applicable to rotorcraft equipped with air intake external screens (**or any air intake that experience has shown prone to same kind of icing which may exist downstream in the engine air intake ducts or engine internal screen**) and has been developed based on in-service experience. **Whenever an existing wind tunnel test data basis exists, and similarity is demonstrated, an analysis may be an acceptable means of compliance.**"

response

Partially Accepted.

The text has been amended to keep it general and let the applicant assess the specific engine induction system whether affected or not. The use of similarity analysis to a previous developed design is also proposed.

This AMC is primarily applicable to rotorcraft equipped with air intake external screens (or any other air intake prone to the same kind of icing which may exist downstream) and has been developed based on in-service experience.

To be written before the last paragraph:

Whenever an applicant is willing to use previous icing wind tunnel tests, an analysis might be an acceptable means of compliance provided that this analysis is adequately validated and covers as a minimum the changes in configurations (air intakes, engines, engine installations, etc.), engine operability (airflow, ingestion capabilities, surge margins, etc.) and thermal environment of the air intake.

AMC1 29.1093(b)(1)(i) Induction system icing protection

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comment

87

comment by: AIRBUS HELICOPTERS

In the second-to-last paragraph of AMC1 29.1093(b)(1)(i) at the bottom of page 91 :
"As specified in CS 27.1093 (b)(1)(i), these tests shall demonstrate that the engine operation is not adversely affected by icing conditions."



	<p>Typo : replace "CS 27.1093" by "CS <u>29</u>.1093" in the above mentioned sentence as follows :</p> <p>AH PROPOSED TEXT : <i>"As specified in CS <u>29</u>.1093 (b)(1)(i), these tests shall demonstrate that the engine operation is not adversely affected by icing conditions."</i></p>
response	Accepted.
	Same as comment #327 by GAMA.
	The change has been implemented into the final text.
comment	<p>89 comment by: AIRBUS HELICOPTERS</p> <p>About the first sentence of AMC1 29.1093(b)(1)(i) : <i>"This AMC is applicable to rotorcraft equipped with air intake external screens and has been developed based on in-service experience."</i></p> <p>Airbus Helicopters suggests to modify in bold and undelined this first sentence as follows :</p> <p>AH PROPOSED TEXT : <i>"This AMC is applicable to rotorcraft equipped with air intake external screens (or any air intake that experience has shown prone to same kind of icing which may exist downstream in the engine air intake ducts or engine internal screen) and has been developed based on in-service experience. Whenever an existing wind tunnel test data basis exists, and similarity is demonstrated, an analysis may be an acceptable means of compliance."</i></p> <p>AH JUSTIFICATION : The search for a critical temperature is presented as specific to external screens, but is to be extended to any air intake that is not based on the water droplet centrifugation principle. For example, Inlet Barrier Filters may, in some circumstances, require the same kind of analysis. Experience / similarity approaches should be possible whenever an existing tested design is similar to the one to be certified.</p>
response	Noted.
	Not considered as per comment #300 (duplicated comment with GAMA).
comment	<p>294 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>AMC1 29.1093 (b)(1)(i)</p> <p><u>Justification</u> GAMA members understand the intend of this new AMC, nonetheless, further guidance is needed from EASA to develop means of testing against this requirement.</p> <p><u>Proposed resolution</u></p>

response	<p>EASA to consider developing further guidance, specially in the form of GM.</p> <p>Noted</p> <p>Same as comment #293. See the reply to this comment.</p>
comment	<p>296 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1093 (b)(1)(i)</p> <p><u>Justification</u> The sentence '...Engine should be run at critical power' seems to be ambiguous and could provide different interpretations.</p> <p>Additionally, the concept of quick accelerations'decelerations in paragraph 14 is not understood.</p> <p><u>Proposed resolution</u> EASA to further clarify the meaning of 'critical power' in the context of the sentence in para (9) and provide a definition of 'quick accelerations/decelerations' in para (14).</p>
response	<p>Accepted.</p> <p>Same as comment #295. See the reply to this comment.</p>
comment	<p>298 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1093 (b)(1)(i)</p> <p><u>Justification</u> Implications of shedding the ice accretion into the test engine and the consequences to the test campaign are not considered within the proposed text.</p> <p><u>Proposed resolution</u> EASA to provide guidance on the implications of shedding the ice accretion into the test engine and the consequences to the test campaign.</p>
response	<p>Noted</p> <p>Same as comment #297. See the reply to this comment.</p>
comment	<p>300 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1093 (b)(1)(i)</p> <p><u>Justification</u> The search for a critical temperature is presented as specific to external screens, but is to be extended to any air intake that is not based on the water droplet centrifugation principle. For example, Inlet Barrier Filters, may, in some circumstances, require the same kind of analysis. Experience / similarity approaches should be possible whenever an existing tested design is similar to the one to be certified.</p>

	<p><u>Proposed resolution</u> EASA to consider changing the fist sentence of the AMC as follows :</p> <p>"This AMC is applicable to rotorcraft equipped with air intake external screens (or any air intake that experience has shown prone to same kind of icing which may exist downstream in the engine air intake ducts or engine internal screen) and has been developed based on in-service experience. Whenever an existing wind tunnel test data basis exists, and similarity is demonstrated, an analysis may be an acceptable means of compliance."</p>
response	<p>Partially Accepted.</p> <p>Same as comment #299. See the reply to this comment.</p>

AMC3 27.307 Proof of structure

p. 92

comment	<p>90 comment by: AIRBUS HELICOPTERS</p> <p>About the reference and title of AMC3 27.307 "<i>Proof of structure</i>" and about the content of AMC3 27.307 (b) "<i>Related Certification Specifications</i>" :</p> <p>Airbus Helicopters suggests modifying the reference and title of this AMC and modifying AMC3 27.307 (b) as follows (strikethrough text to be deleted and underlined bold text to be added) :</p> <p>AH PROPOSED TEXT : "AMC3 27.307 <i>Proof of structure</i> AMC 27.562 Emergency landing dynamic conditions [...] (b) Related Certification Specifications - <i>CS 27.307 Proof of structure</i> - <i>CS 27.561 General</i> - CS 27.562 Emergency landing dynamic conditions - <i>CS 27.785 Seats, berths, safety belts, and harnesses</i>"</p> <p>AH JUSTIFICATION : The purpose of this AMC is to give guidance to know when the seat/floor interface should be substantiated to CS 27.561, to CS 27.562 or both. CS 27.562 application or not is the driven criteria. CS 27.307 is only a reference to AMC1 27.307, created in this NPA, which allows classifying a design as new, similar-new or similar, which is not the main purpose of this AMC. This AMC is related to seat/floor interface and not to seat, so that CS 27.785 should not be referenced.</p>
response	<p>Noted</p> <p>Not considered as per comment #301 (duplicated comment with GAMA).</p>
comment	<p>92 comment by: AIRBUS HELICOPTERS</p>



response	<p>About the second paragraph shown on the top of the page 93 in AMC3 27.307 (c) : "To treat an adapter or other new interface structure as part of the floor when it does not appear to be similar to conventional floor structure, the applicant must substantiate that the adapter plate or any other structure installed between the existing floor and the seat attachment will not constitute a weak element under <u>minor crash conditions</u>. [...]"</p> <p>AH COMMENT : The meaning of "minor crash conditions" should be clarified</p> <p>Noted</p> <p>Not considered as per comment #304 (duplicated comment with GAMA).</p>
comment	<p>301 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC3 27.307</p> <p><u>Justification</u> The purpose of this AMC is to give guidance to know when the seat/floor interface should be substantiated to CS 27.561, to CS 27.562 or both. CS 27.562 application or not is the driven criteria. CS 27.307 is only a reference to AMC1 27.307 also created in this NPA which allows classifying a design as new, similar-new or similar, which is not the main purpose of this AMC. This AMC is related to seat/floor interface and not to seat so that CS27.785 should not be referenced.</p> <p><u>Proposed resolution</u> AMC title AMC3 27.307 Proof of structure AMC 27.562 Emergency landing dynamic conditions</p> <p>(b) Related Certification Specifications CS 27.307 Proof of structure CS 27.561 General CS 27.562 Emergency landing dynamic conditions CS 27.785 Seats, berths, safety belts, and harnesses</p>
response	<p>Partially accepted</p> <p>A reference to CS 27.562 has been added while maintaining the reference to CS 27.307 and 785.</p> <p>AMC3 27.307 provides criteria to classify the adapter plate as part of the floor (CS 27.561) or part of the seat (CS 27.561, 562, 785).</p> <p>CS 27.307 addresses the means of compliance to be selected for structural demonstration.</p> <p>CS 27.785 is the entry point for CS 27.561 and 27.562.</p>
comment	<p>304 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC3 27.307 (c), para (7)</p>

	<p><u>Justification</u> The following sentence in paragraph 7 'the seat attachment will not constitute a weak element under minor crash conditions' is not clear.</p> <p><u>Proposed resolution</u> EASA to clarify the meaning of 'minor crash conditions'.</p>
response	<p>Partially accepted. Minor crash conditions should be survivable crash addressed and covered under CS 27.561 (emergency landing conditions). AMC3 27.307 has been updated accordingly.</p>

AMC3 29.307 Proof of structure

p. 95

comment	<p>91 comment by: AIRBUS HELICOPTERS</p> <p>About the reference and title of AMC3 29.307 "<i>Proof of structure</i>" and about the content of AMC3 29.307 (b) "<i>Related Certification Specifications</i>" :</p> <p>Airbus Helicopters suggests modifying the reference and title of this AMC and modifying AMC3 29.307 (b) as follows (strikethrough text to be deleted and underlined bold text to be added) :</p> <p>AH PROPOSED TEXT : "AMC3 29.307 <i>Proof of structure</i> AMC 29.562 Emergency landing dynamic conditions [...] (b) <i>Related Certification Specifications</i> - <i>CS 29.307 Proof of structure</i> - <i>CS 29.561 General</i> - CS 29.562 Emergency landing dynamic conditions - <i>CS 29.785 Seats, berths, safety belts, and harnesses</i>"</p> <p>AH JUSTIFICATION : The purpose of this AMC is to give guidance to know when the seat/floor interface should be substantiated to CS 29.561, to CS 29.562 or both. CS 29.562 application or not is the driven criteria. CS 29.307 is only a reference to AMC1 29.307, created in this NPA, which allows classifying a design as new, similar-new or similar, which is not the main purpose of this AMC. This AMC is related to seat/floor interface and not to seat so that CS 29.785 should not be referenced.</p>
response	<p>Noted</p> <p>Not considered as per comment #302 (duplicated comment with GAMA).</p>
comment	<p>93 comment by: AIRBUS HELICOPTERS</p> <p>About the second paragraph shown on the top of the page 96 in AMC3 29.307 (c) : "<i>To treat an adapter or other new interface structure as part of the floor when it does not</i></p>



	<p><i>appear to be similar to conventional floor structure, the applicant must substantiate that the adapter plate or any other structure installed between the existing floor and the seat attachment will not constitute a weak element under <u>minor crash conditions</u>. [...]"</i></p> <p>AH COMMENT : The meaning of "<i>minor crash conditions</i>" should be clarified</p>
response	<p>Noted</p>
	<p>Not considered as per comment #305 (duplicated comment with GAMA).</p>
comment	<p>302 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC3 29.307</p> <p><u>Justification</u> The purpose of this AMC is to give guidance to know when the seat/floor interface should be substantiated to CS 29.561, to CS 29.562 or both. CS 29.562 application or not is the driven criteria. CS 29.307 is only a reference to AMC1 29.307 also created in this NPA which allows classifying a design as new, similar-new or similar, which is not the main purpose of this AMC. This AMC is related to seat/floor interface and not to seat so that CS29.785 should not be referenced.</p> <p><u>Proposed resolution</u> AMC title AMC3 29.307 Proof of structure AMC 29.562 Emergency landing dynamic conditions</p> <p>(b) Related Certification Specifications CS 29.307 Proof of structure CS 29.561 General CS 29.562 Emergency landing dynamic conditions CS 29.785 Seats, berths, safety belts, and harnesses</p>
response	<p>Partially accepted</p> <p>A reference to CS 29.562 has been added while maintaining the reference to CS 29.307 and 785. AMC3 29.307 provides criteria to classify the adapter plate as part of the floor (CS 29.561) or part of the seat (CS 29.561, 562, 785). CS 29.307 addresses the means of compliance to be selected for structural demonstration CS 29.785 is the entry point for CS 29.561 and 29.562.</p>
comment	<p>305 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC3 29.307 (c), para (7)</p> <p><u>Justification</u></p>

	<p>The following sentence in paragraph 7 'the seat attachment will not constitute a weak element under minor crash conditions' is not clear.</p> <p><u>Proposed resolution</u> EASA to clarify the meaning of 'minor crash conditions'.</p>
response	<p>Partially accepted.</p> <p>Minor crash conditions should be survivable crashes, addressed and covered under CS 29.561 (emergency landing conditions). AMC3 29.307 has been updated accordingly.</p>

AMC1 27.561 General

p. 98

comment	<p>94 comment by: AIRBUS HELICOPTERS</p> <p>About the second paragraph of AMC1 27.561 : "<i>In the <u>stowage compartment</u>, if separated with a partition, it is anticipated as per the CS 27.787 requirement that items (luggage, cargo, etc.) will be restrained up to 12g. If the cabin is adjacent to the <u>baggage compartment</u>, the protection of the occupants within the cabin is ensured by the installation of a structural partition (bulkhead) sized to 12g for the maximum allowed baggage or cargo weight, regardless of the instructions to restrain the baggage.</i>"</p> <p>AH COMMENT : The definitions used in this AMC of a stowage compartment and of a baggage compartment, in addition to their location, should be added</p>
response	<p>Noted.</p> <p>Not considered as per comment #306 (duplicated comment with GAMA).</p>
comment	<p>96 comment by: AIRBUS HELICOPTERS</p> <p>About the second sentence of the second paragraph of AMC1 27.561 : "<i>If the cabin is adjacent to the baggage compartment, the protection of the occupants within the cabin is ensured by the installation of a structural partition (bulkhead) sized to 12g for the maximum allowed baggage or cargo weight, regardless of the instructions to restrain the baggage.</i>"</p> <p>Airbus Helicopters considers this requirement as solution prescriptive and suggests a more objective/performance based requirement as follows :</p> <p>AH PROPOSED TEXT : "<i>If the cabin is adjacent to the baggage compartment, the protection of the occupants within the cabin should be ensured by means for restraining the maximum allowed baggage or cargo weight under forward 12 g.</i>"</p> <p>AH JUSTIFICATION :</p>



	<p>It is reminded that instructions in the Flight Manual and placards for safe operations in order to secure baggages or cargo weight (eg. by using of a net) are mandatory to be followed by the operator.</p>
response	<p>Noted.</p> <p>Not considered as per comment #308 (duplicated comment with GAMA).</p>
comment	<p>232 comment by: <i>Bell</i></p> <p>Changes to AMC1 27.561, 27.787, 29.561 & 29.787 does not meet the criteria of not complex and not controversial. The changes to the AMC go beyond what has been found compliant on past products and will add significant cost and weight.</p> <p>Remove Item 35 from the NPA and generate a dedicated RMT with the appropriate cost impact analysis to ensure that the impact is properly assessed</p>
response	<p>Not accepted.</p> <p>AMC1 27.787 and 29.787 clarify the conditions applicable to the cargo and baggage compartment. These conditions have been systematically addressed in previous certifications. AMC1 27.561 and 29.561 have been removed to only focus on AMC1 27.787 and 29.787, applicable to cargo and baggage compartments including the structural partition.</p>
comment	<p>306 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.561</p> <p><u>Justification</u> The following sentence in paragraph 2 'In the stowage compartment, if separated with a partition...' is not clear.</p> <p><u>Proposed resolution</u> EASA to add in the AMC definitions of what are a stowage and a baggage compartment, in addition to their location.</p>
response	<p>Partially accepted.</p> <p>AMC1 27.561 has been removed but AMC1 27.787 has been maintained. The denomination 'Cargo and baggage compartments' is now used to be consistent with the CS 27.787 requirement.</p>
comment	<p>308 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.561</p> <p><u>Justification</u> The following sentence "If the cabin is adjacent to the baggage compartment, the protection of the occupants within the cabin is ensured by the installation of a structural partition (bulkhead) sized to 12g for the maximum allowed baggage or cargo weight, regardless of the instructions to restrain the baggage." does not consider that</p>

	<p>instructions in the Flight Manual and placards are mandatory to be followed by the operator.</p> <p><u>Proposed resolution</u> GAMA considers this requirement as solution prescriptive and suggests a more objective/performance based requirement :</p> <p>"If the cabin is adjacent to the baggage compartment, the protection of the occupants within the cabin should be ensured by means for restraining the maximum allowed baggage or cargo weight under forward 12 g."</p>
response	<p>Partially accepted. AMC1 27.561 has been removed. New wording has been used for AMC1 27.787, but only the structural partition allows the 12g conditions. Without structural partition, CS 27.561(b)(3) applies.</p>
comment	<p>310 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.561</p> <p><u>Justification</u> The AMC requires that partitions between the cabin and occupant area be sized for 12g crash loads. Loads in a cargo area are required to be restrained (like any installed equipment) to meet the applicable crash loads. Cargo restrains themselves, with the applicable instructions to ensure that loads are restrained are sufficient to meet the requirements of 27.561 (c) / 27.787(c)(2) without the need to have bulky partitions between the cabin and the occupant compartment.</p> <p>Adding bulky partitions based on the AMC will set a new precedence and is not the current practice for compliance to 27.561(c) / 27.787(c)(2) . Partitions based on the AMC will add significant cost and weight.</p> <p><u>Proposed resolution</u> EASA to remove the AMC regarding the need for partitions that can retain loads of up to 12g.</p>
response	<p>Not accepted. See comment #308. AMC1 27.561 has been removed. New wording has been used for AMC1 27.787.</p>

AMC1 29.561 General

p. 99

comment	<p>95 comment by: <i>AIRBUS HELICOPTERS</i></p> <p>About the second paragraph of AMC1 29.561 : "<i>In the <u>stowage compartment</u>, if separated with a partition, it is anticipated as per the CS 29.787 requirement that items (luggage, cargo, etc.) will be restrained up to 12g. If the cabin is adjacent to the <u>baggage compartment</u>, the protection of the occupants within the cabin is ensured by the installation of a structural partition (bulkhead) sized to 12g for the maximum</i></p>
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response	<p><i>allowed baggage or cargo weight, regardless of the instructions to restrain the baggage."</i></p> <p>AH COMMENT : The definitions used in this AMC of a stowage compartment and of a baggage compartment, in addition to their location, should be added</p> <p>Noted.</p> <p>Not considered as per comment 307 (duplicated comment with GAMA).</p>
comment	<p>97 comment by: AIRBUS HELICOPTERS</p> <p>About the second sentence of the second paragraph of AMC1 29.561 : "<i>If the cabin is adjacent to the baggage compartment, the protection of the occupants within the cabin is ensured by the installation of a structural partition (bulkhead) sized to 12g for the maximum allowed baggage or cargo weight, regardless of the instructions to restrain the baggage."</i></p> <p>Airbus Helicopters considers this requirement as solution prescriptive and suggests a more objective/performance based requirement as follows :</p> <p>AH PROPOSED TEXT : <i>"If the cabin is adjacent to the baggage compartment, the protection of the occupants within the cabin should be ensured by means for restraining the maximum allowed baggage or cargo weight under forward 12 g."</i></p> <p>AH JUSTIFICATION : It is reminded that instructions in the Flight Manual and placards for safe operations in order to secure baggages or cargo weight (eg. by using of a net) are mandatory to be followed by the operator.</p> <p>Noted.</p> <p>Not considered as per comment #309 (duplicated comment with GAMA).</p>
comment	<p>307 comment by: General Aviation Manufacturers Association (GAMA)</p> <p>AMC1 29.561</p> <p><u>Justification</u> The following sentence in paragraph 2 'In the stowage compartment, if separated with a partition...' is not clear.</p> <p><u>Proposed resolution</u> EASA to add in the AMC definitions of what are a stowage and a baggage compartment, in addition to their location.</p> <p>Partially accepted.</p>
response	

AMC1 29.561 has been removed but the AMC1 29.787 has been maintained. The denomination 'Cargo and baggage compartments' is now used to be consistent with the CS 29.787 requirement.

comment

309

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

AMC1 29.561

Justification

The following sentence "If the cabin is adjacent to the baggage compartment, the protection of the occupants within the cabin is ensured by the installation of a structural partition (bulkhead) sized to 12g for the maximum allowed baggage or cargo weight, regardless of the instructions to restrain the baggage." does not consider that instructions in the Flight Manual and placards are mandatory to be followed by the operator.

Proposed resolution

GAMA considers this requirement as solution prescriptive and suggests a more objective/performance based requirement :

"If the cabin is adjacent to the baggage compartment, the protection of the occupants within the cabin should be ensured by means for restraining the maximum allowed baggage or cargo weight under **forward** 12 g."

response

Partially accepted.

AMC1 29.561 has been removed.

New wording has been used for AMC1 29.787 but only the structural partition allows the 12g conditions. Without structural partition, CS 29.561(b)(3) applies.

comment

311

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

AMC1 29.561

Justification

The AMC requires that partitions between the cabin and occupant area be sized for 12g crash loads. Loads in a cargo area are required to be restrained (like any installed equipment) to meet the applicable crash loads. Cargo restrains themselves, with the applicable instructions to ensure that loads are restrained are sufficient to meet the requirements of 29.561 (c) / 29.787(c)(2) without the need to have bulky partitions between the cabin and the occupant compartment.

Adding bulky partitions based on the AMC will set a new precedence and is not the current practice for compliance to 29.561(c) / 29.787(c)(2) . Partitions based on the AMC will add significant cost and weight.

Proposed resolution

EASA to remove the AMC regarding the need for partitions that can retain loads of up to 12g.

response

Not accepted.

See comment #309.



AMC1 29.561 has been removed.
New wording has been used for AMC1 29.787.

AMC1 27.1309 Equipment, systems, and installations

p. 101

comment	<p>102</p> <p>comment by: AIRBUS HELICOPTERS</p> <p>Airbus Helicopters has a general comment about AMC1 27.1309</p> <p>AH COMMENT : Is it the CS 27.1309 rule at Amendment 9 which is considered in this AMC , or is it the the project of CS27.1309 dealt through RMT.0712? For the review purpose, the other AH comments about AMC1 27.1309 are made against CS27 at amdt 9.</p>
response	<p>Noted</p> <p>Not considered as per comment #312 (duplicated comment with GAMA).</p>
comment	<p>107</p> <p>comment by: AIRBUS HELICOPTERS</p> <p>About the paragraphs (a) and (b)</p> <p>AH COMMENT : The role and needs with respect to ED-14()/DO-160() environmental qualification activities should be clarified, as directly contributing to qualitative objectives of safety as per Development Assurance.</p> <p>AH JUSTIFICATION : CS 27.1309(a) requires equipment, systems, and installations [...] to perform "<i>their intended function under any foreseeable operating condition</i>" : these aspects are mainly covered through the environmental qualification activities prescribed today in AC 27-1B with DO160(). This is also part of qualitative objectives that are to be achieved for safety assessment and therefore should not be omitted.</p>
response	<p>Noted</p> <p>Not considered as per comment #314 (duplicated comment with GAMA).</p>
comment	<p>110</p> <p>comment by: AIRBUS HELICOPTERS</p> <p>About the second paragraph of AMC1 27.1309 : "<i>Any analysis necessary to show compliance with CS 27.1309(b) should consider the possibility of development errors and should focus on minimising the likelihood of those errors.</i>"</p> <p>Airbus Helicopters suggests to CS 27.1309(a) instead of CS 27.1309(b) as far as CS27 Amdt 09 is considered.</p> <p>AH PROPOSED TEXT :</p>



"Any analysis necessary to show compliance with CS 27.1309(a) should consider the possibility of development errors and should focus on minimising the likelihood of those errors."

AH JUSTIFICATION :

Current CS27 Amdt 9 is not consistent with the proposed AMC1 27.1309, the text should be correlated to existing Amendment or it should be clarified that AMC1 27.1309 anticipates RMT.0712 outcomes.

CS27.1309(b) is driving safety assessment for multi-engines, why excluding CS27.1309(c) ? Safety assessment defines qualitative objectives to be met, anyhow when dealing with development assurance, CS27.1307(a) seems more adequate. This comment remains applicable considering NPA 2021-11 modification of CS27.1309 (a).

response

Noted

Not considered as per comment #315 (duplicated comment with GAMA).

comment

205

comment by: *Leonardo Helicopters*

ref. page 101-102, point (a) and (b) for both AMC1 27.1309 & 29.1309:
for CAT A rotorcraft, could the requirement CS27/29.1309(b)(2) be satisfied by the safety analysis or the malfunction flight report while SW & AEH artifacts be used for satisfaction of the 1309(a) only?

Rationale for comment:

considerations for CAT A rotorcraft: SW & AEH are developed in agreement with the IDAL assigned by the System Safety Assessment (SSA); the IDAL determine the rigor to demonstrate compliance to the ED standard while the evaluation of the probability of failure/malfunction occurrence, addressed in 1309(b)(2), is peculiar of the SSA.

Proposed solution:

re-wording proposed:

IS:

- "This AMC recognises AMC 20-115 as an acceptable means of compliance with the requirements in CS 2x.1309 (a) and (b)"
- "This AMC recognises AMC 20-152 as an acceptable means of compliance with the requirements in CS 2x.1309 (a) and (b)"

BECOMES:

- "This AMC recognises AMC 20-115 as an acceptable means of compliance with the requirements in CS 2x.1309 (a) and (b)(1)"
- "This AMC recognises AMC 20-152 as an acceptable means of compliance with the requirements in CS 2x.1309 (a) and (b)(1)"



response	<p>Not accepted.</p> <p>Within CS-27, there is only one unique (b) without sub-paragraphs (1) and (2). Within CS-29, CS 29.1309(b) is to be fully included, as it drives the DAL allocation and then the level of rigor (assurance) expected for systems, software or hardware. This is consistent with the approach followed on other CSs. For CS-27 aircraft, it also relates to CS 2x. 1309(c).</p>
comment	<p>312 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.1309</p> <p><u>Justification</u> GAMA has a general comment about AMC1 27/29.1309.</p> <p><u>Proposed resolution</u> Is it the CS 27.1309 rule at Amendment 9 / CS 29.1309 rule at Amendment 10 which is considered in this AMC , or is it the project of CS27/29.1309 dealt through RMT.0712? For the review purpose, the other GAMA comments about AMC1 27/29.1309 are made against CS27 at amdt 9 / CS 29 at amdt 10.</p>
response	<p>Noted</p> <p>The answers provided in this RMT do consider RMT.0712.</p>
comment	<p>314 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 27.1309</p> <p><u>Justification</u> With respect to paragraphs (a) and (b) :</p> <p>CS 27.1309(a) requires equipment, systems, and installations [...] to perform "their intended function under any foreseeable operating condition" : these aspects are mainly covered through the environmental qualification activities prescribed today in AC 27-1B with DO160(). This is also part of qualitative objectives that are to be achieved for safety assessment and therefore should not be omitted.</p> <p><u>Proposed resolution</u> The role and needs with respect to ED-14()/DO-160() environmental qualification activities should be clarified, as directly contributing to qualitative objectives of safety as per Development Assurance.</p>
response	<p>Not accepted.</p> <p>'under any foreseeable operating condition' is well established terminology in the context of CS XX.1309. We appreciate that ED-14()/DO-160() supports compliance with the requirements but the term 'under any foreseeable operating condition' encompasses more than just compliance under environmental conditions.</p>
comment	<p>315 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p>

AMC1 27.1309

Justification

With respect to the second paragraph of AMC1 27.1309 : "Any analysis necessary to show compliance with CS 27.1309 (b) should consider the possibility of development errors and should focus on minimising the likelihood of those errors."

Current CS 27 Amdt 9 is not consistent with the proposed AMC1 27.1309, the text should be correlated to existing Amendment or it should be clarified that AMC1 27.1309 anticipates RMT.0712 outcomes.

CS27.1309(b) is driving safety assessment for multi-engines, why excluding CS27.1309(c) ? Safety assessment defines qualitative objectives to be met, anyhow when dealing with development assurance, CS27.1307(a) seems more adequate. This comment remains applicable considering NPA 2021-11 modification of CS27.1309 (a).

Proposed resolution

GAMA suggests to CS 27.1309(a) instead of CS 27.1309(b) as far as CS27 Amdt 09 is considered :

"Any analysis necessary to show compliance with CS 27/29.1309(a) should consider the possibility of development errors and should focus on minimising the likelihood of those errors."

response

Partially accepted.

As mentioned in comment #312, the current RMT was developed in coordination with RMT.0712. However, we agree to update this sentence to reference 1309 (a) & (b) (& (c) for CS-27). This will be applied to both AMC1 27.1309 and 29.1309.

AMC1 29.1309 Equipment, systems, and installations

p. 102

comment

98

comment by: AIRBUS HELICOPTERS

About the sentence at the bottom of the page 102 : "*The extent of application of ED-79A/ARP4754A to substantiate development assurance activities depends on the complexity of the systems and on their level of interaction with other systems.*"

Airbus helicopters suggests modifying in bold and underlined the above sentence as follows :

AH PROPOSED TEXT :

"*The extent of application of ED-79A/ARP4754A to substantiate development assurance activities depends on **the novelty combined with the complexity of the systems and on their level of interaction with other systems.***"

AH JUSTIFICATION :

Change to an existing system (no novelty) should follow the already agreed development process, ie. possibility to take credit of development assurance activities performed on a previously certificated "baseline" aircraft.



response	Noted Not considered as per comment #317 (duplicated comment from GAMA).
comment	<p>103 comment by: AIRBUS HELICOPTERS</p> <p>Airbus Helicopters has a general comment about AMC1 29.1309</p> <p><u>AH COMMENT :</u> Is it the CS 29.1309 rule at Amendment 10 which is considered in this AMC , or is it the the project of CS29.1309 dealt through RMT.0712? For the review purpose, the other AH comments about AMC1 29.1309 are made against CS 29 at amdt 10.</p>
response	Noted Not considered as per comment #312 (duplicated comment from GAMA).
comment	<p>104 comment by: AIRBUS HELICOPTERS</p> <p>About the sentence : "<i>ED-79A/ARP4754A is recognised as providing acceptable guidelines for establishing a development assurance process from aircraft and systems levels down to the level where software/airborne electronic hardware (AEH) development assurance is applied.</i>"</p> <p><u>AH COMMENT :</u> IMA and links with ED-124 standard should be clarified in the AMC1 29.1309.</p> <p><u>AH JUSTIFICATION :</u> SW and AEH are considered as items, specificity of IMA is not addressed in the AMC, is it intentional?</p>
response	Noted Not considered as per comment #318 (duplicated comment with GAMA).
comment	<p>105 comment by: AIRBUS HELICOPTERS</p> <p>About :</p> <ul style="list-style-type: none"> • the sentences : "<i>ED-79A/ARP4754A is recognised as providing acceptable guidelines for establishing a development assurance process from aircraft and systems levels down to the level where software/airborne electronic hardware (AEH) development assurance is applied. The extent of application of ED-79A/ARP4754A to substantiate development assurance activities depends on the complexity of the systems and on their level of interaction with other systems.</i>" • and the bullets (a), (b) and (c)

For highlighting the recognition of ED-79A, it is suggested to create a dedicated bullet point for ED-79A and carrying on with SW, AEH and OPR aspects as follows :

AH PROPOSED TEXT :

" (a) ED-79A/ARP4754A is recognized as providing acceptable guidelines [...] on the complexity of the systems and on their level of interaction with other systems".

(b) Software development assurance
[...]

(c) Airborne Electronic Hardware development assurance
[...]

(d) Open Problem Report management
[...]"

AH JUSTIFICATION :

Activities listed in (a) "Software development assurance" and (b) "AEH development assurance" are by nature not subjected to ED-79A : is it in direct relationship with the above mentioned sentence about ED-79A or is it just another clarification of the AMC to highlight latest AMC 20 ?

If so, it might easier to identify the recognition of ED-79A as the first bullet point and carrying on with SW, AEH and OPR aspects as per the above AH proposed text.

response Noted

Not considered as per comment #319 (duplicated comment from GAMA).

comment 106 comment by: AIRBUS HELICOPTERS

About the paragraphs (a) and (b)

AH COMMENT :

The role and needs with respect to ED-14()/DO-160() environmental qualification activities should be clarified, as directly contributing to qualitative objectives of safety as per Development Assurance.

AH JUSTIFICATION :

CS 29.1309(a) requires "equipment, systems, and installations" [...] to perform "their intended function under any foreseeable operating condition" : these aspects are mainly covered through the environmental qualification activities prescribed today in AC 27-1B with DO160(). This is also part of qualitative objectives that are to be achieved for safety assessment and therefore should not be omitted.

response Noted

Not considered as per comment #320 (duplicated comment with GAMA).

comment 109 comment by: AIRBUS HELICOPTERS

About the second paragraph of AMC1 29.1309 : "Any analysis necessary to show compliance with CS 29.1309(b) should consider the possibility of development errors and should focus on minimising the likelihood of those errors."



	<p>Airbus Helicopters suggests to CS 29.1309(a) instead of CS 29.1309(b) as far as CS29 Amdt 10 is considered.</p> <p>AH PROPOSED TEXT : <i>"Any analysis necessary to show compliance with CS 29.1309(a) should consider the possibility of development errors and should focus on minimising the likelihood of those errors."</i></p> <p>AH JUSTIFICATION : As per Amdt 10 of CS29, CS29.1309(b) is driving safety assessment which defines qualitative objectives to be met, anyhow when dealing with development assurance, CS29.1309(a) seems more adequate. This comment remains applicable considering NPA 2021-11 modification of CS29.1309 (a).</p>
response	<p>Noted</p> <p>Not considered as per comment #316 (duplicated comment from GAMA).</p>

comment	<p>206 comment by: <i>Leonardo Helicopters</i></p> <p>The following statements (ref. bottom of page 102): "ED-79A/ARP4754A is recognised as providing acceptable guidelines for establishing a development assurance process from aircraft and systems levels down to the level where software/airborne electronic hardware (AEH) development assurance is applied. The extent of application of ED-79A/ARP4754A to substantiate development assurance activities depends on the complexity of the systems and on their level of interaction with other systems." should be substantiated by decomposing the A/C into complex sub-systems, to which ARP4754A shall be applied; and simple sub-systems, for which a combination of tests and analysis can be considered exhaustive.</p> <p>Rationale for comment: the proposal is based on the definition of "ANALYSIS" detailed in the ARP4754A and the intent is to apply ARP4754A starting from the level of decomposition that introduces complexity. It is understood that both the ARP4754A and this NPA are focused on mitigating the possibility of development errors in complex systems.</p> <p>Proposed solution: add: "For complex or integrated systems," just before the statement "ED-79A/ARP4754A is recognised as providing acceptable guidelines for establishing a development assurance process [...]"</p>
response	<p>Noted</p>



The comment is agreed. However, we consider it is already covered in the following sentence: 'The extent of application of ED-79A/ARP4754A to substantiate development assurance activities depends on the complexity of the systems and on their level of interaction with other systems.'

comment 313 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 29.1309

Justification

GAMA has a general comment about AMC1 27/29.1309.

Proposed resolution

Is it the CS 27.1309 rule at Amendment 9 / CS 29.1309 rule at Amendment 10 which is considered in this AMC , or is it the project of CS27/29.1309 dealt through RMT.0712? For the review purpose, the other GAMA comments about AMC1 27/29.1309 are made against CS27 at amdt 9 / CS 29 at amdt 10.

response Noted

Not considered as per comment #312 (duplicated comment with GAMA).

comment 316 comment by: *General Aviation Manufacturers Association (GAMA)*

AMC1 29.1309

Justification

With respect to the second paragraph of AMC1 29.1309 : "Any analysis necessary to show compliance with CS 29.1309 (b) should consider the possibility of development errors and should focus on minimising the likelihood of those errors."

As per Amdt 10 of CS29, CS29.1309(b) is driving safety assessment which defines qualitative objectives to be met, anyhow when dealing with development assurance, CS29.1309(a) seems more adequate. This comment remains applicable considering NPA 2021-11 modification of CS29.1309 (a).

Proposed resolution

GAMA suggests to CS 29.1309(a) instead of CS 29.1309(b) as far as CS29 Amdt 10 is considered :

"Any analysis necessary to show compliance with CS 29.1309(a) should consider the possibility of development errors and should focus on minimising the likelihood of those errors."

response Partially accepted.

As mentioned in comment #312, the current RMT was developed in coordination with RMT.0712. However, we agree to update this sentence to reference 1309 (a) & (b) (& (c) for CS-27). This will be applied to both AMC1 27.1309 and 29.1309.



comment	<p>317 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1309</p> <p><u>Justification</u> In relation with the following sentence: "The extent of application of ED-79A/ARP4754A to substantiate development assurance activities depends on the complexity of the systems and on their level of interaction with other systems."</p> <p>The change to an existing system (no novelty) should follow the already agreed development process, ie. possibility to take credit of development assurance activities performed on a previously certificated "baseline" aircraft.</p> <p><u>Proposed resolution</u> EASA to consider the following additional text:</p> <p>"The extent of application of ED-79A/ARP4754A to substantiate development assurance activities depends on the novelty combined with the complexity of the systems and on their level of interaction with other systems."</p>
response	<p>Not accepted.</p> <p>The sentence is about applicability. Novelty is not to be considered for the determination of the applicability. It is however considered in relation with the EASA involvement.</p>
comment	<p>318 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1309</p> <p><u>Justification</u> With respect to the sentence : "ED-79A/ARP4754A is recognised as providing acceptable guidelines for establishing a development assurance process from aircraft and systems levels down to the level where software/airborne electronic hardware (AEH) development assurance is applied."</p> <p>SW and AEH are considered as items, specificity of IMA is not addressed in the AMC, is it intentional?</p> <p><u>Proposed resolution</u> IMA and links with ED-124 standard should be clarified in the AMC1 29.1309.</p>
response	<p>Accepted.</p> <p>A reference to AMC 20-170 has been included in AMC1 29.1309 and in AMC1 27.1309.</p>
comment	<p>319 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1309</p> <p><u>Justification</u></p>

	<p>With respect to :</p> <ul style="list-style-type: none"> - the sentences : "ED-79A/ARP4754A is recognised as providing acceptable guidelines for establishing a development assurance process from aircraft and systems levels down to the level where software/airborne electronic hardware (AEH) development assurance is applied. The extent of application of ED-79A/ARP4754A to substantiate development assurance activities depends on the complexity of the systems and on their level of interaction with other systems." - and the bullets (a), (b) and (c) <p>Activities listed in (a) "Software development assurance" and (b) "AEH development assurance" are by nature not subjected to ED-79A : is it in direct relationship with the above mentioned sentence about ED-79A or is it just another clarification of the AMC to highlight latest AMC 20 ?</p> <p>If so, it might easier to identify the recognition of ED-79A as the first bullet point and carrying on with SW, AEH and OPR aspects as per the above proposed text.</p> <p><u>Proposed resolution</u></p> <p>For highlighting the recognition of ED-79A, it is suggested to create a dedicated bullet point for ED-79A and carrying on with SW, AEH and OPR aspects as follows in the proposed text:</p> <p>" (a) ED-79A/ARP4754A is recognized as providing acceptable guidelines [...] on the complexity of the systems and on their level of interaction with other systems". (b) Software development assurance [...] (c) Airborne Electronic Hardware development assurance [...] (d) Open Problem Report management [...] "</p>
response	<p>Accepted.</p> <p>The text has been updated as proposed.</p>

comment	<p>320 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>AMC1 29.1309 para (a) and (b)</p> <p><u>Justification</u></p> <p>With respect to the paragraphs (a) and (b) : CS 29.1309(a) requires "equipment, systems, and installations" [...] to perform "their intended function under any foreseeable operating condition" : these aspects are mainly covered through the environmental qualification activities prescribed today in AC 27-1B with DO160(). This is also part of qualitative objectives that are to be achieved for safety assessment and therefore should not be omitted.</p> <p><u>Proposed resolution</u></p> <p>The role and needs with respect to ED-14()/DO-160() environmental qualification activities should be clarified, as directly contributing to qualitative objectives of safety as per Development Assurance.</p>
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response

Not accepted.

'under any foreseeable operating condition' is well established terminology in the context of CS XX.1309. We appreciate that ED-14()/DO-160() supports compliance with the requirements but the term 'under any foreseeable operating condition' encompasses more than just compliance under environmental conditions.

AMC 1 29.1319 Equipment, systems and network information security protection

p. 104

comment

99

comment by: AIRBUS HELICOPTERS

Airbus Helicopters concurs with this AMC1 29.1319, ie. with the added text : "*The term 'adverse effects on the safety of the rotorcraft' should be understood in the context of information security as catastrophic or hazardous.*"

It is proposed to add the following text in a new AMC1 27.1319 to be created by EASA and in the existing AMC1 29.1319:

AH PROPOSED TEXT :

" *Tailoring to ED-203A which is referred in AMC 20-42 is the following one:*

- *Table 2-2 - airworthiness risk acceptability matrix: The following risks are acceptable:*
 - *Risk associated to hazardous threat condition and moderate level of threat*
 - *Risk associated to catastrophic threat condition and low level of threat.*
- *§ 4.2.3 and §4.2.4: Assurance objectives O8.1, O8.2, O8.3 and O9.3 in paragraphs 4.2.3 and 4.2.4 of ED-203A are not applicable to COTS components in items."*

AH JUSTIFICATION :

Substantiation of the comment about tailoring of ED-203A:

- on tailoring of ED-203A security risk matrix:

ED-203A, which has been released in 2018, is the result of a significant industry experience in cybersecurity on large airplanes since the early 2000s: experience has shown that cyber solutions, architectures, activities and associated costs driven by ED-203A are commensurate with the overall complexity and the overall costs for a brand new large airplane TC. On the contrary on helicopters, there are neither use cases nor technical and economic impact assessment justifying a positive safety benefit vs costs ratio for applying ED-203A as is. Any approach promoting ED-203A without tailoring and without impact assessment would not be consistent with the EASA rulemaking process requiring a systematic "Regulatory Impact Assessment" (RIA). Therefore a tailored risk matrix is proposed on helicopters to accommodate the objective of appropriate security risk architecture for security risk management and integration constraints on helicopters: a low level of threat is considered acceptable for catastrophic threat condition and a moderate level of threat is considered acceptable for hazardous threat condition.



	<p>- <u>on tailoring of ED-203A security assurance objectives for helicopters</u> :</p> <p>Assurance activities carried out to satisfy objectives O2.x, O3.x, O5.x, ensure appropriate vulnerability management for COTS in security functions on rotorcraft. Therefore, there is little benefit from additional assurance from objectives O8.1, O8.2, O8.3 and O9.3. For COTS components in items/systems (ie., non-ETSO articles), it is suggested that the assurance objectives from ED-203A referred in AMC 20-42 be modified accordingly.</p> <p>This proposal supersedes the need of further CRI for every upcoming certification project and is consistent with AMC 20-42 item 6 "RISK ACCEPTABILITY" which is already open to flexibility for rotorcraft.</p> <p>This proposal allows a new baseline for risk acceptability and assurance for rotorcraft.</p>
response	<p>Noted</p> <p>Not considered as per comment #321 (duplicated comment with GAMA).</p>
comment	<p>118 comment by: ASD</p> <p><u>Commented submitted on behalf of ASD-Europe</u></p> <p>ASD concurs with this AMC1 29.1319, ie. with the added text : "<i>The term 'adverse effects on the safety of the rotorcraft' should be understood in the context of information security as catastrophic or hazardous.</i>"</p> <p>It is proposed to add the following text in a new AMC1 27.1319 to be created by EASA and in the existing AMC1 29.1319:</p> <p><u>PROPOSED TEXT :</u></p> <p>" <i>Tailoring to ED-203A which is referred in AMC 20-42 is the following one:</i></p> <ul style="list-style-type: none"> • <i>Table 2-2 - airworthiness risk acceptability matrix: The following risks are acceptable:</i> <ul style="list-style-type: none"> ○ <i>Risk associated to hazardous threat condition and moderate level of threat</i> ○ <i>Risk associated to catastrophic threat condition and low level of threat.</i> • <i>§ 4.2.3 and §4.2.4: Assurance objectives O8.1, O8.2, O8.3 and O9.3 in paragraphs 4.2.3 and 4.2.4 of ED-203A are not applicable to COTS components in items."</i> <p><u>JUSTIFICATION :</u></p> <p>Substantiation of the comment about tailoring of ED-203A:</p> <p>- <u>on tailoring of ED-203A security risk matrix:</u></p> <p>ED-203A, which has been released in 2018, is the result of a significant industry experience in cybersecurity on large airplanes since the early 2000s: experience has shown that cyber solutions, architectures, activities and associated costs driven by ED-203A are commensurate with the overall complexity and the overall costs for a brand</p>

new large airplane TC. On the contrary on helicopters, there are neither use cases nor technical and economic impact assessment justifying a positive safety benefit vs costs ratio for applying ED-203A as is. Any approach promoting ED-203A without tailoring and without impact assessment would not be consistent with the EASA rulemaking process requiring a systematic “Regulatory Impact Assessment” (RIA). Therefore a tailored risk matrix is proposed on helicopters to accommodate the objective of appropriate security risk architecture for security risk management and integration constraints on helicopters: a low level of threat is considered acceptable for catastrophic threat condition and a moderate level of threat is considered acceptable for hazardous threat condition.

- on tailoring of ED-203A security assurance objectives for helicopters :

Assurance activities carried out to satisfy objectives O2.x, O3.x, O5.x, ensure appropriate vulnerability management for COTS in security functions on rotorcraft. Therefore, there is little benefit from additional assurance from objectives O8.1, O8.2, O8.3 and O9.3. For COTS components in items/systems (ie., non-ETSO articles), it is suggested that the assurance objectives from ED-203A referred in AMC 20-42 be modified accordingly.

This proposal supersedes the need of further CRI for every upcoming certification project and is consistent with AMC 20-42 item 6 “RISK ACCEPTABILITY” which is already open to flexibility for rotorcraft.

This proposal allows a new baseline for risk acceptability and assurance for rotorcraft.

response

Noted

Not considered as per comment #321 (duplicated comment with GAMA).

comment

321

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

AMC1 29.1319

Justification

GAMA concurs with this AMC1 29.1319, ie. with the added text : "The term ‘adverse effects on the safety of the rotorcraft’ should be understood in the context of information security as catastrophic or hazardous."

Substantiation of the comment about tailoring of ED-203A:

- on tailoring of ED-203A security risk matrix:

ED-203A, which has been released in 2018, is the result of a significant industry experience in cybersecurity on large airplanes since the early 2000s: experience has shown that cyber solutions, architectures, activities and associated costs driven by ED-203A are commensurate with the overall complexity and the overall costs for a brand new large airplane TC. On the contrary on helicopters, there are neither use cases nor technical and economic impact assessment justifying a positive safety benefit vs costs ratio for applying ED-203A as is. Any approach promoting ED-203A without tailoring and without impact assessment would not be consistent with the EASA rulemaking process requiring a systematic “Regulatory Impact Assessment” (RIA). Therefore a tailored risk matrix is proposed on helicopters to accommodate the objective of appropriate security risk architecture for security risk management and integration constraints on helicopters: a low level of threat is considered acceptable for



catastrophic threat condition and a moderate level of threat is considered acceptable for hazardous threat condition.

- on tailoring of ED-203A security assurance objectives for helicopters :
Assurance activities carried out to satisfy objectives O2.x, O3.x, O5.x, ensure appropriate vulnerability management for COTS in security functions on rotorcraft. Therefore, there is little benefit from additional assurance from objectives O8.1, O8.2, O8.3 and O9.3. For COTS components in items/systems (ie., non-ETSO articles), it is suggested that the assurance objectives from ED-203A referred in AMC 20-42 be modified accordingly.

This proposal supersedes the need of further CRI for every upcoming certification project and is consistent with AMC 20-42 item 6 "RISK ACCEPTABILITY" which is already open to flexibility for rotorcraft.

This proposal allows a new baseline for risk acceptability and assurance for rotorcraft.

Proposed resolution

GAMA would like to propose EASA to add the following text in a newly created AMC 27.1319 and in existing AMC1 29.1319 on the tailoring of ED-203A:

"Tailoring to ED-203A which is referred in AMC 20-42 is the following one:

- table 2-2 - airworthiness risk acceptability matrix:

The following risks are acceptable:

- a) Risk associated to hazardous threat condition and moderate level of threat
- b) Risk associated to catastrophic threat condition and low level of threat.

- § 4.2.3 and §4.2.4:

Assurance objectives O8.1, O8.2,O8.3 and O9.3 in paragraphs 4.2.3 and 4.2.4 of ED-203A are not applicable to COTS components in items."

response

Not accepted.

EASA does not see the need to update AMC 27.1319 and AMC 29.1319, since those AMC are not considered to be the best place to address tailoring of EUROCAE standards. EASA considers that the best option is to develop the tailoring activities at standardisation organisation level (EUROCAE). This work is ongoing and WG-112 has developed ED-305 (tailoring of ED-202A and ED-203A for VTOLs) including the update of the acceptance matrix and assurance objective O8.1, O8.2, O8.3 and O9.3.

AMC1 27.1305(l)(2) Powerplant instruments

p. 105

comment

100

comment by: AIRBUS HELICOPTERS

About the paragraph AMC1 27.1305(l)(2)(b) : "A *pre-flight test capability is provided for each sensor to preclude an associated latent failure; and*"

Airbus Helicopters suggests modifying in bold and underline this paragraph as follows :

AH PROPOSED TEXT :



"(b) A pre-flight test capability is provided for each sensor to preclude an associated latent failure **if determined as needed as per the outcomes of the safety assessment used for showing compliance with the safety objectives required by CS27.1305 (I)(ii)** ;"

AH JUSTIFICATION :

AH concurs to give possibility to install a fuel quantity sensor and a fuel low-level sensor on the same supporting structure. Indeed, architecture concepts with physical dependencies between these two functions are widely used on rotorcraft fuel systems with good in service experience. Proposed AMC provides design precautions that should be demonstrated in case of mechanical dependency. AH agrees on the need of electrical independancy of the sensors. However, AH considers that the change of the rule CS 27.1305 (I)(ii) proposed by EASA in item #39 on page 104 ("*be designed and constructed so as to meet the minimum safety objectives compatible with the most severe hazard*") is not consistent with the text of the AMC1 27.1305(I)(2)(b) "A pre-flight test capability is provided for each sensor to preclude an associated latent failure". AH considers that the need of a pre-flight test capability should be assessed and considered as necessary through the safety analysis.

response

Noted

Not considered as per comment #322 (duplicated comment with GAMA).

comment

322

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

AMC1 27.1305 (I)(2)

Justification

GAMA concurs to give possibility to install a fuel quantity sensor and a fuel low-level sensor on the same supporting structure. Indeed, architecture concepts with physical dependencies between these two functions are widely used on rotorcraft fuel systems with good in service experience. Proposed AMC provides design precautions that should be demonstrated in case of mechanical dependency. GAMA agrees on the need of electrical independancy of the sensors.

However, GAMA considers that the text of the rules CS27.1305 (I) (ii) and CS29.1305 (a)(4)(ii) ("*be designed and constructed so as to meet the minimum safety objectives compatible with the most severe hazard*") is not consistent with the text of the AMC1 27.1305(I)(2)(b) and AMC1 29.1305(a)(4)(b) "A pre-flight test capability is provided for each sensor to preclude an associated latent failure". GAMA considers that the need of a pre-flight test capability should be assessed and considered as necessary through the safety analysis.

Proposed resolution

Proposed change as follows:

AMC1 27.1305(I)(2) :

(b) A pre-flight test capability is provided for each sensor to preclude an associated latent failure if determined as needed as per the outcomes of the safety assessment used for showing compliance with the safety objectives required by CS27.1305 (I)(ii) ;



response Partially accepted.
Sub-paragraph (b) has been modified along the proposed lines to maintain the need for a test capability but not necessarily as a pre-flight check requirement.

AMC1 29.1305(a)(4) Powerplant instruments

p. 106

comment 101 comment by: AIRBUS HELICOPTERS

About the paragraph AMC1 29.1305(a)(4)(b) : "A pre-flight test capability is provided for each sensor to preclude an associated latent failure; and"

Airbus Helicopters suggests modifying in bold and underline this paragraph as follows :

AH PROPOSED TEXT :

"(b) A pre-flight test capability is provided for each sensor to preclude an associated latent failure **if determined as needed as per the outcomes of the safety assessment used for showing compliance with the safety objectives required by CS29.1305 (a)(4)(ii)** ;"

AH JUSTIFICATION :

AH concurs to give possibility to install a fuel quantity sensor and a fuel low-level sensor on the same supporting structure. Indeed, architecture concepts with physical dependencies between these two functions are widely used on rotorcraft fuel systems with good in service experience. Proposed AMC provides design precautions that should be demonstrated in case of mechanical dependancy. AH agrees on the need of electrical independancy of the sensors. However, AH considers that the change of the rule CS29.1305 (a)(4)(ii) proposed by EASA in item #39 on page 105 ("*be designed and constructed so as to meet the minimum safety objectives compatible with the most severe hazard*") is not consistent with the text of the AMC1 29.1305(a)(4)(b) "A pre-flight test capability is provided for each sensor to preclude an associated latent failure". AH considers that the need of a pre-flight test capability should be assessed and considered as necessary through the safety analysis.

response Noted
Not considered as per comment #323 (duplicated comment with GAMA).

comment 323 comment by: General Aviation Manufacturers Association (GAMA)

AMC1 29.1305 (a)(4)

Justification

GAMA concurs to give possibility to install a fuel quantity sensor and a fuel low-level sensor on the same supporting structure. Indeed, architecture concepts with physical dependencies between these two functions are widely used on rotorcraft fuel systems with good in service experience. Proposed AMC provides design precautions that should be demonstrated in case of mechanical dependancy. GAMA agrees on the need of electrical independancy of the sensors.



However, GAMA considers that the text of the rules CS27.1305 (l) (ii) and CS29.1305 (a)(4)(ii) ("be designed and constructed so as to meet the minimum safety objectives compatible with the most severe hazard") is not consistent with the text of the AMC1 27.1305(l)(2)(b) and AMC1 29.1305(a)(4)(b) "A pre-flight test capability is provided for each sensor to preclude an associated latent failure". GAMA considers that the need of a pre-flight test capability should be assessed and considered as necessary through the safety analysis.

Proposed resolution

Proposed change as follows:

AMC1 29.1305(a)(4) :

(b) A pre-flight test capability is provided for each sensor to preclude an associated latent failure if determined as needed as per the outcomes of the safety assessment used for showing compliance with the safety objectives required by CS29.1305 (a)(4)(ii) ;

response

Partially accepted.

Sub-paragraph (b) has been modified along the proposed lines to maintain the need for a test capability but not necessarily as a pre-flight check requirement.

CS 29.801 Ditching

p. 106

comment

108

comment by: AIRBUS HELICOPTERS

It is proposed to add an AMC to CS 27.801(c)(1) and an AMC to CS 29.801(c)(1) in order to provide guidance to establish the crash loads:

AH PROPOSED TEXT:

- For AMC to CS 27.801(c)(1) :
"Crash loads corresponding to the water impact are not specifically defined and should be established by the applicant. Applicant methodology to establish those loads found acceptable to the Agency for showing compliance may be used as means of compliance to 27.801(c)(1)."
- For AMC to CS 29.801(c)(1) :
"Crash loads corresponding to the water impact are not specifically defined and should be established by the applicant. Applicant methodology to establish those loads found acceptable to the Agency for showing compliance may be used as means of compliance to 29.801(c)(1)."

AH JUSTIFICATION :

CS 29.801(c)(1) says : "be designed such that the effects of a water impact (i.e. crash) on the emergency flotation system are minimised". In the CRD 2020-16, EASA indicated "The intent of CS 29.801(c)(1) is the consideration of the design of the emergency flotation system (EFS) to minimise the effects of a water impact (crash) on its functionality. 'Crash' loads are not specifically defined. "

response

Noted



Not considered as per comment #324 (duplicated comment with GAMA).

comment	<p>324 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p>CS 29.801</p> <p><u>Justification</u> With respect of this paragraph: (c) (1) be designed such that the effects of a water impact (i.e. crash) on the emergency flotation system are minimised.</p> <p>In the CRD 2020-16 EASA indicated "The intent of CS 29.801(c)(1) is the consideration of the design of the emergency flotation system (EFS) to minimise the effects of a water impact (crash) on its functionality. 'Crash' loads are not specifically defined. "</p> <p><u>Proposed resolution</u> It is proposed to add AMC to CS 27/29.801(c)(1) to provide guidance to establish the crash loads: "Crash loads corresponding to the water impact are not specifically defined and should be established by the applicant. Applicant methodology to establish those loads found acceptable to the Agency for showing compliance may be used as means of compliance to 27/29.801(c)(1)."</p>
response	<p>Not Accepted.</p> <p>Please see CRD 2016-01, Comment 170: The applicant should consider the disrupting effects of a water impact on the integrity of the emergency flotation system and, where practicable, design the system installation to withstand those effects. It is not expected that a quantitative assessment of the effects should be made.</p>

8.2. The text is clear, readable and understandable

p. 112

comment	<p>2 comment by: <i>AOPA Sweden</i></p> <p>AOPA Sweden Comment on NPA 2022-01</p> <p>Item 8</p> <p>8.1 Neutral 8.2 Disagree. The text is too comprehensive. Narrow it down which makes it easier for the reader. 8.3 Neutral 8.4 Agree 8.5 Neutral 8.6 Disagree It does not mention in what way the proposal is better.</p> <p>Fredrik Brandel AOPA Sweden</p>
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response

Noted.

Many thanks for your feedback.

We will consider your suggestions in our future NPAs.

