



**COMMENT RESPONSE DOCUMENT (CRD)
TO NOTICE OF PROPOSED AMENDMENT (NPA) 2007-17**

**for amending the Executive Director Decision No. 2003/15/RM of 14 November 2003
on certification specifications, including airworthiness codes and acceptable means
of compliance, for small rotorcraft (« CS-27 »)**

and

**for amending the Executive Director Decision No. 2003/16/RM of 14 November 2003
on certification specifications, including airworthiness codes and acceptable means
of compliance, for large rotorcraft (« CS-29 »)**

and

**for amending the Executive Director Decision No. 2003/17/RM of 14 November 2003
on certification specifications, including airworthiness codes and acceptable means
of compliance, for very light rotorcraft (« CS-VLR »)**

"Advisory Circulars Revision (AC Revision)"

Explanatory Note

I. General

1. The purpose of the Notice of Proposed Amendment (NPA), dated 05 December 2007 was to propose an amendment to Decision N° 2003/15/RM of the Executive Director of the European Aviation Safety Agency of 14 November 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for small rotorcraft (« CS-27 ») and to propose an amendment to Decision N° 2003/16/RM of the Executive Director of the European Aviation Safety Agency of 14 November 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for large rotorcraft (« CS-29 ») and to propose an amendment to Decision N° 2003/17/RM of the Executive Director of the European Aviation Safety Agency of 14 November 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for very light rotorcraft (« CS-VLR »).

II. Consultation

2. The draft Executive Director Decision amending Decision N° 2003/15/RM, Decision N° 2003/16/RM and Decision N° 2003/17/RM was published on the web site (<http://www.easa.europa.eu>) on 5 December 2007.

By the closing date of 5 March 2008, the European Aviation Safety Agency (the Agency) had received 28 comments from 8 National Aviation Authorities, professional organisations and private companies.

III. Publication of the CRD

3. All comments received have been acknowledged and incorporated into this Comment Response Document (CRD) with the responses of the Agency.
4. In responding to comments, a standard terminology has been applied to attest the Agency's acceptance of the comment. This terminology is as follows:
 - **Accepted** – The comment is agreed by the Agency and any proposed amendment is wholly transferred to the revised text.
 - **Partially Accepted** – Either the comment is only agreed in part by the Agency, or the comment is agreed by the Agency but any proposed amendment is partially transferred to the revised text.
 - **Noted** – The comment is acknowledged by the Agency but no change to the existing text is considered necessary.
 - **Not Accepted** - The comment or proposed amendment is not shared by the Agency

The resulting text highlights the changes as compared to the current rule.

5. The Agency's Decision will be issued at least two months after the publication of this CRD to allow for any possible reactions of stakeholders regarding possible misunderstandings of the comments received and answers provided.
6. **Such reactions should be received by the Agency not later than 22 October 2008 and should be submitted using the Comment-Response Tool at <http://hub.easa.europa.eu/crt>.**

IV. Note on AMC VLR/27/29.351: Yawing Condition

Most of the comments received on NPA 2007-17 relate to the introduced of AMC VLR/27/29.351 into Book 2 of the CSs. The comments indicate that the reasons underlying their introduction and how the Agency intends to develop these in the future, are not fully understood. This section is added to clarify these points.

It must be remembered that the overriding objective of this task is to adopt AC 27-1B Change 2 and AC 29-2C Change 2, published by the USA Federal Aviation Administration (FAA), as AMC in CS-VLR/27/29. The task is long overdue as the ACs, which were originally intended as harmonised material, were published by the FAA in April 2006. The task is broader than just yawing conditions and will directly benefit industry by providing consistent acceptable means of compliance and guidance material over a wide range of subjects. The Appendix to NPA 2007-17 identifies the extent of the changes made in Change 2.

Historically, FAA Part 27 & 29 AC revisions were coordinated between FAA and the European Joint Aviation Authorities (JAA) through the JAA Rotorcraft Steering Group (RSG), which had representatives from FAA, National Aviation Authorities (NAAs) and both USA and European manufacturing industry. In 2003, prior to the start of EASA, the FAA initiated the AC 2006 review with the aim of updating the AC material for publication in 2006. Many of the proposed changes were initiated at the request of European organisations and were in progress during the transition from JAA to EASA. However, prior to completion of this revision, the RSG was disbanded and the FAA progressed this activity with no or limited support from NAAs/EASA.

As an independent regulator, the Agency is obliged to review and assess the suitability of any regulatory material in a European context, prior to adoption. This was done for Change 2, resulting in a number of issues being raised. Some of these issues were considered minor and would not prevent adoption of Change 2 by the Agency, although the Agency intends to raise these issues with the FAA at the next revision cycle for further review and possible action. However, in the case of AC 27/29.351, the Agency determined that the method of compliance stipulated in Change 2 is contrary to Agency certification practice and that an inadequate level of safety will result. Furthermore, the material is considered to be misleading or unclear in places.

The Agency's prime concern is that the interpretation of the rule given in Change 2 does not provide adequate structural substantiation when applied to modern rotorcraft designs. The Agency's specific concerns can be summarised as follows:

- i. Change 2 stipulates a MoC that reduces the standard previously interpreted by Agency structures specialists and applied through the CRI system. Manufacturers were looking to take immediate advantage from this change.
- ii. Based on an in-depth analysis of accident data, future trends in rotorcraft yaw capability and certification practice, maintaining the safety standard was seen as a prudent move in order to prevent future structural safety concerns.
- iii. Adopting Change 2 as written would create legal uncertainty within the Agency and provide a "presumption of compliance" for AC 27/29.351 that the Agency would be compelled to accept. Any attempt by the Agency to demand the use of alternate means of compliance could then be challenged by an applicant.

In parallel with this task, a separate EASA rulemaking group (27&29.003) is currently active and is tasked specifically at addressing the yawing condition of xx.351; including reviewing and amending AC/AMC and making recommendations to change the rule, if appropriate. The Agency is actively involved in this activity and intends to fully implement future recommendations from the group. However, in the intervening period before this task can be completed, which may still take some years, and with the original objective of adopting FAA

ACs at Change 2 in mind, the Agency has had to develop a new AMC xx.351 to address its concerns. In developing these AMCs, the Agency has been influenced by the on-going discussions within the 27&29.003 rulemaking group, to the extent that EASA structures specialists now accept that the interpretation of the rule contained in Change 2 is acceptable for rotorcraft structural components that are subject to a combination of thrust, aerodynamic and inertia loads. However, the Agency retains the view, supported by the 27&29.003 group, that structural components mainly loaded by aerodynamic forces from flight at large sideslip angles are not sufficiently covered. The 27&29.003 rulemaking group has requested an extension to its terms of reference to develop the aerodynamics rule. The new AMC xx.351 proposed in NPA 2007-17 primarily addresses this aerodynamics issue and provides an acceptable means of compliance based on existing certification practice. Other changes introduced into AMC xx.351 are aimed at providing greater clarity of the intended rule.

So, in summary, in order to adopt FAA AC 27-1B and 29-2C at Change 2, the Agency determined that additional AMC was required for the following reasons:

- a. Unless it was accepted otherwise, to enable the continuation of established Agency certification practice, in the short-term.
- b. Provide a conservative approach to structural substantiation, recognising the increased capability of modern rotorcraft and in-service experience, and to prevent manufactures from taking advantage of any temporary reduction in standards.
- b. The timescale needed to reach agreement within the 27&29.003 rulemaking group on a harmonised approach and the time necessary to implement these changes within the CSs was likely to be protracted.

The Agency recognises that the 27&29.003 rulemaking group is the appropriate forum to discuss and develop xx.351. In due course, the new AMCs will be amended or withdrawn to align with the recommendations arising from the rulemaking group.

V. CRD table of comments, responses and resulting text

A. Explanatory Note - V. Content of the draft decisions		p. 4
comment	<i>I</i>	comment by: <i>Francis Fagegaltier Services</i>
	Explanatory note, paragraph IV It is noted that comments are requested only on the proposed changes, which are made to CS-27, CS-29 and CS-VLR. These changes mainly consist in adopting two FAA Advisory Circulars which have already been published and which, therefore, are no longer open to comments. When seeing, in the appendix to this NPA, the list of changes made by these FAA ACs, it appears that this is a huge rulemaking package. In short, this means that European citizens and interested parties are not consulted on the real content of the changes made to the EASA Certification Specifications. It is believed that this NPA is not consistent with the principles set in EU Regulation 1592/2002.	
response	<i>Not accepted</i> The aim of the NPA was twofold: firstly to provide European stakeholders with an opportunity to comment on the new AMC that had been developed by a dedicated EASA rulemaking group following a review of FAA AC at Change 2; and secondly to propose additional AMC if differences with the FAA AC were identified. The full list of changes introduced in the FAA ACs at Change 2 was provided to assist stakeholders in this regard. Having been advised by the FAA that no changes to their published ACs could be made, the only option for EASA and European stakeholders to specify differences with the ACs was through the publication of additional AMCs within the CSs.	

A. Explanatory Note - V. Regulatory Impact Assessment		p. 4
comment	<i>17</i>	comment by: <i>Christian Giry - Eurocopter</i>
	<i>"This NPA addresses AMC only and will have no significant impact.":</i> This NPA defines new standards "for the design of rotorcraft structural components that are principally subjected in flight to significant aerodynamic loads". It would have an appreciable impact on the design of the affected components.	
response	<i>Not accepted</i> The NPA details an acceptable means of compliance which reflects the Agency's interpretation and policy for showing compliance with the certification specifications of CS VLR/27/29.351. Publication of the AMC will not alter the standard, but provide stakeholders with clear and open regulation.	

comment 2

comment by: *Francis Fagegaltier Services*

Background and discussion, paragraph I.10
Of course, "Retaining a single, harmonised book of AC/AMC has many benefits and is an efficient and cost effective means of regulation». But, the associated rulemaking process should be open to comments by European citizens and interested parties.

This is clearly not achieved here when, in paragraph I.13, the following is stated : "However, prior to completion of this revision, the RSG was disbanded and the FAA progressed this activity with no or limited support from NAAs/EASA. In April 2006, the FAA published the AC revisions as AC 27-1B Change 2 and AC 29-2C Change 2".

It is, of course, acceptable for EASA to establish "rulemaking task 27&29.012 to review the FAA published revision and to determine the acceptance of the published material". But the outcome should be submitted to review and comments by EU citizens, especially when the task group was only composed of "FAA, EASA and NAAs".

It is understood that the "helicopter" rulemaking made by JAA was quite special, not very similar to the rulemaking on other JARs. But, in a totally new legal framework, the Agency should think of reverting to a normal rulemaking process, as done for other aircraft codes.

The inconsistency of the NPA with already published EASA's certification specifications on engine FADEC illustrates the difficulties introduced by the rulemaking process used for elaborating this NPA, where many subjects are simultaneously addressed without involvement of appropriate technical experts.

response *Noted*

Previously, in order to permit the adoption of FAA rotorcraft AC material as AMC to JARs, a formal harmonisation procedure was developed and agreed by the JAA Rotorcraft Steering Group (RSG) and endorsed by Central JAA. The procedure provided opportunities for the involvement of European interested parties throughout the development process, including proposing new tasks and being consulted on draft text. JAA NPAs 27-19 & 29-25, dated 1 August 2001 formally announced the creation of this agreement.

The development of FAA AC 27-1B/29-2C Change 2 followed this procedure until the creation of EASA impacted on its ability to function and the RSG was formally disbanded. The FAA subsequently progressed the AC without formal European involvement or coordination in accordance with the schedule. Changed text was however made available on the FAA website as soon as it was deemed mature and its availability notified in the Federal Register with a request for comment. However, it is acknowledged that European interested parties may not have been kept fully informed as the development of the AC material progressed. The creation of a dedicated EASA rulemaking group to review the published FAA text and the publication of this NPA are intended to redress these shortfalls.

Harmonisation procedures are continuing to be developed and strengthened.

comment

3

comment by: *Francis Fagegaltier Services*

Explanation of changes, proposal related to CS-27
The following sentences should be further explained :
“...any attempt by EASA to apply higher standards within individual certification programmes could then be challenged.
The new AMC represents a minimum standard acceptable to EASA,.....”.

Indeed, no AMC would represent a minimum standard and any attempt of rulemaking by advisory material could be challenged. For example, the correct statement is found in the proposed AMC 27.351 : “the certification specification CS 27.351 provides a minimum safety standard for the design of rotorcraft ...”.

It is acknowledged that, when FAR 27 is at high level in the legal structure of texts in the USA, CS-27 is at low level (non binding) : as a consequence, “rulemaking by advisory material” would have a different meaning on both sides of the Ocean. However, the agency should clarify its policy with regard to what was called “rulemaking by advisory material”.

It is believed that Book 1 should contain the certification specifications and Book 2 should be limited to guidance material / acceptable means of compliance, without changing the text and intent of Book 1.

response

Noted

An AMC is by definition an acceptable means of compliance and an applicant could rightfully claim compliance with the related certification specification if the AMC was fully applied. This "presumption of compliance" is binding on the Agency and could be challenged if the Agency subsequently stipulated that a more demanding compliance demonstration be used.

AMC 27&29.351 are currently under review by a dedicated EASA rulemaking group. It is likely that additional Book 1 and Book 2 material will be developed that clearly separates certification specifications (Book 1) from the AMC of Book 2.

comment

5

comment by: *Francis Fagegaltier Services*

Critical parts

It is surprising to see harmonisation on advisory material related to critical parts when there is no harmonised definition of such parts (as stated in the AC 27-1B itself). What is the intent of EASA with regard to rulemaking on critical parts ?

response

Noted

This harmonisation activity was aimed at resolving a long standing difference between FAA and one European NAA and specifically relates to the definition of critical parts for rotorcraft.

Rulemaking Task 21.004, aimed at harmonising the definition of Critical Parts in Part 21 and across all CSs, remains on the Agency's rulemaking inventory.

comment 10 comment by: *Christian Giry - Eurocopter*
"EASA has found no evidence of catastrophic structural failure due directly to loads arising from yawing conditions":
No problem is thus clearly identified whereas a rulemaking group is currently addressing the yawing manoeuvres issue. It seems hasty to issue an AMC without waiting for the output of the working group.

response *Noted*
The lack of evidence is not justification for a safe condition. The Agency remains concerned that some specific aspects of the demonstration of structural integrity are not fully addressed under the interpretation given in FAA AC (e.g. aerodynamic loads and system/structural interactions). The Agency's policy in this regard has been influenced by the on-going discussions within the rulemaking group where these same areas of concern have been identified.

AMC VLR/27/29.351 is being published at this time to avoid the Agency being constrained to accept FAA AC 27/29.351 in full. It is intended as a holding position and will be reviewed following the outcome of the dedicated yawing condition rulemaking group activity.

Overall, adoption of FAA AC 27-1B/29-2C Change 2 into the CSs will enhance harmonisation.

comment 11 comment by: *Christian Giry - Eurocopter*
"a recommendation to change FAA Part 27.351 and/or a new rule is currently being developed to provide clarification of the manoeuvre to be performed.":
This statement is clearly anticipating on the working group conclusions. "Recommend an option to be used for future rulemaking" (ToR CS-27&29/003 refers) is part of the objective of the group and needs thus to be investigated. Nobody can however tell now what will come out.

response *Noted*
The rulemaking group has already reached some provisional conclusions, including the need for a new rule to address aerodynamic loading. The Agency's policy and the development of this NPA have been influenced by the work on-going within the yawing conditions rulemaking group.

The new AMC VLR/27/29.351 will be amended or withdrawn at a future date to align with the final outcome from the rulemaking group.

comment 13 comment by: *Christian Giry - Eurocopter*
"modern rotorcraft designs, which have a greater yawing capability than was envisaged when the certification specification was previously developed."
At the time when the limit sideslip angle was introduced (FAR 27/29.351 Amdts. 27-26/29-30), helicopters already had a yawing capability beyond this limit. This limit was however considered, based on experience, as providing a safe structural design standard (FR 7992, March 6, 1990).

response *Not accepted*

The capability of rotorcraft at the time of the requirement's introduction is not the prime issue. Historically, civil helicopter designs were either derived from military types or developed for both military and civil applications. Military requirements are generally more severe in this regard and became de facto the design standard. The lack of accidents/incidents is not evidence that the evolving civil standards are adequate. We are now seeing modern helicopter designs being produced specifically for the civil market that have increased capability and may be designed solely to the minimum civil standard. The yawing conditions rulemaking group has established that FAR/CS 27/29.351 needs to be supplemented with an additional rule to address aerodynamic loading as a result of flight at large sideslip angles.

comment

14

comment by: *Christian Giry - Eurocopter*

"Although EASA has found no evidence of catastrophic structural failure due directly to loads arising from yawing conditions, several examples of service incidents indicate that high sideslip angles, well above the 15 degrees stipulated in the certification specification have been achieved at high speed close to Vh resulting from tail rotor malfunctions or atmosphere disturbances.": Those incidents are only due to tail rotor or engine failures, and, to a lesser degree, to atmospheric disturbances.

Tail rotor failure is already addressed in AC 27/29.1585 b. (2)/(3) Emergency Procedures.

Recovery in other cases is aided by a greater tail rotor thrust capability which allows to reduce the achieved sideslip angles by providing the pilot with more control to counteract the disturbance.

There is no evidence that the selected incidents and a greater manoeuvre capability can be used as an argument to define new design criteria for "structural components that are principally subjected in flight to significant aerodynamic loads".

response

Not accepted

AC 27/29.1585 b. (2)/(3) does not address structural loads.

In-service accidents and incidents have been reviewed as part of the yawing conditions rulemaking group activity to help identify the capabilities of existing designs. This review, together with discussions within the group, led to the need for a new rule addressing aerodynamic loads being identified.

comment

15

comment by: *Christian Giry - Eurocopter*

"it is EASA's view that recovery was aided by the robust structural design of these rotorcraft, which had been designed to comply with more stringent yawing conditions":

It seems that two thirds of the service incidents involve helicopters that were initially certified according to CAR6 or FAR27 requirements, where the yawing manoeuvre paragraph did not exist. Without further inquiry it must be considered that the absence of structural failure could also be explained by loads that were not as high as suggested by EASA.

response

Not accepted

The capability of rotorcraft at the time of the requirement's introduction is not the prime issue. Historically, civil helicopter designs were either derived from military types or developed for both military and civil applications. Military

requirements are generally more severe in this regard and became de facto the design standard. The lack of accidents/incidents is not evidence that the evolving civil standards are adequate. We are now seeing modern helicopter designs being produced specifically for the civil market that have increased capability and may be designed solely to the minimum civil standard. The yawing conditions rulemaking group has established that FAR/CS 27/29.351 needs to be supplemented with an additional rule to address aerodynamic loading as a result of flight at large sideslip angles.

B. Background - b) Proposals related to CS-29 p. 8-9

comment 6 comment by: Francis Fagegaltier Services

Critical parts
It is surprising to see harmonisation on advisory material related to critical parts when there is no harmonised definition of such parts (as stated in the AC 27-1B itself). What is the intent of EASA with regard to rulemaking on critical parts ?

response *Noted*

This harmonisation activity was aimed at resolving a long standing difference between FAA and one European NAA and specifically relates to the definition of critical parts for rotorcraft.
Rulemaking Task 21.004, aimed at harmonising the definition of Critical Parts in Part 21 and across all CSs, remains on the Agency's rulemaking inventory.

comment 8 comment by: Francis Fagegaltier Services

see following comment on changes to CS-27
Explanation of changes, proposal related to CS-27
The following sentences should be further explained :
“...any attempt by EASA to apply higher standards within individual certification programmes could then be challenged.
The new AMC represents a minimum standard acceptable to EASA,.....”.

Indeed, no AMC would represent a minimum standard and any attempt of rulemaking by advisory material could be challenged. For example, the correct statement is found in the proposed AMC 27.351 : “the certification specification CS 27.351 provides a minimum safety standard for the design of rotorcraft ...”.

It is acknowledged that, when FAR 27 is at high level in the legal structure of texts in the USA, CS-27 is at low level (non binding) : as a consequence, “rulemaking by advisory material” would have a different meaning on both sides of the Ocean. However, the agency should clarify its policy with regard to what was called “rulemaking by advisory material”.

It is believed that Book 1 should contain the certification specifications and Book 2 should be limited to guidance material / acceptable means of compliance, without changing the text and intent of Book 1.

response *Noted*

An AMC is by definition an acceptable means of compliance and an applicant

could rightfully claim compliance with the related certification specification if the AMC was fully applied. This "presumption of compliance" is binding on the Agency and could be challenged if the Agency subsequently stipulated that a more demanding compliance demonstration be used.

AMC 27&29.351 are currently under review by a dedicated EASA rulemaking group. It is likely that additional Book 1 and Book 2 material will be developed that clearly separates certification specifications (Book 1) from the AMC of Book 2.

C. DRAFT DECISIONS - I. Proposals related to CS-27 - Proposal 4: Amend AMC 27 General	p. 11
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comment	9	comment by: <i>Bodo Werner-Graf</i>
response	<i>Noted</i> N/A	

C. DRAFT DECISIONS - I. Proposals related to CS-27 - Proposal 5: Add a new AMC 27.351 Yaw Manoeuvre Conditions	p. 11-12
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comment	12	comment by: <i>Christian Giry - Eurocopter</i>
	<i>"b. Interaction of System and Structure"</i> This is a clearer rewording of the AC-27/29.351 corresponding part addressing the failure of the yawing limiting devices. This rewording should avoid misinterpretations and is fully supported by EC. However, FAA and EASA have basically no divergence on this aspect and it would seem preferable to amend the ACs wording rather than introduce an additional AMC.	
response	<i>Noted</i> Since the FAA ACs are now published, no change in their wording is now possible. Only through additional EASA AMC can clarification be provided in the short-term.	

comment	16	comment by: <i>Christian Giry - Eurocopter</i>
	<i>"this standard may not necessarily be adequate for the design of rotorcraft structural components that are principally subjected in flight to significant aerodynamic loads"</i> : The intent seems to apply new higher standards for primarily aerodynamically loaded structural components. In that case the rule itself should be changed. Ruling by AMC would not be acceptable.	
	<i>"In lieu of acceptable design criteria developed by the applicant, a suitable combination of sideslip angle and airspeed for the design of rotorcraft components subjected to aerodynamic loads may be obtained from a full rational simulation of the yaw manoeuvre of CS 27.351 extended, beyond the sideslip-speed envelope specified in the rule, until the rotorcraft reaches the</i>	

maximum overswing sideslip angle resulting from its motion around the yaw axis.":

What is clearly required by this AMC is to substantiate the components that are subjected to aerodynamic loads in a wider sideslip envelope than the tailboom, whereas those components are not as critical as the tailboom is. This does not seem to be consistent.

response *Not accepted*

One of the difficulties previously encountered in trying to provide a common interpretation of AC 27/29.351 was the lack of clarity within the rule itself and whether transient angles greater than the line should be included or omitted from the analysis. Transient angles will have a significant impact on the aerodynamic loads that might directly design some components, the failure of which could also be flight critical (e.g. fin). For components designed by a combination of thrust, inertia and aerodynamic loads (e.g. tailboom), the yawing conditions working group has found that the FAA AC provides an adequate envelop for the design of such components, and the Agency concurs.

The AMC text has been amended to be non-prescriptive and to provide further clarification. Future developments within the yawing condition rulemaking group will determine how and to what extent aerodynamic loading will be regulated.

comment

18

comment by: *Christian Giry - Eurocopter*

"a. Aerodynamic Loads ":

EC disagree with this proposal for the following reasons developed in other comments:

- no real safety justification
- establishing by AMC of a new design standard more stringent than required by existing rules
- action taken without waiting for the 27&29.003 study group outcome

response *Not accepted*

As previously stated, the proposal simply reflects the Agency's interpretation of the existing rule. (See also response to comments #10 and #11)

comment

19

comment by: *Christian Giry - Eurocopter*

EC position:

Propose to delete paragraph AMC 27/29.351 Yaw manoeuvre conditions.

Reasons:

For area a. Aerodynamic Loads, see comment 18.

For area b. Interaction of System and Structure, see comment 12 (non controversial issue, may wait for FAA/EASA harmonisation).

response *Not accepted*

For a) see response to comment 18

For b) The interaction of system/structures is still in fact a controversial issue within the yawing condition rulemaking group. There is an opinion, supported by the FAA, that the whole text should be deleted from AC 27/29.351. As stated by EC in comment 12, the new text is a clearer rewording, should avoid

misinterpretation and is fully supported by EC. It is therefore appropriate to retain the text in the new AMC pending further discussion and consensus being reached within the rulemaking group.

comment 21

comment by: AIA

Industry Position on NPA - 17/2007

The following comments represent those made by the Industry representatives of the AIA Rotorcraft Subcommittee and the EASA 27&29.003 Yaw Maneuver Working Group and are in response to the Notice of Proposed Amendment (NPA) No 2007-17. The comments are specifically related to Proposal 5 for CS-27 and CS-29.

1. As we agree the current regulations do not address an aerodynamic loads rule for the design of aerodynamic sensitive surfaces we consider existing company imposed internal design criteria an acceptable MOC. As there is no in-service evidence that suggests a potential safety concern with the current world rotorcraft fleet, we believe there is no urgency to change these criteria until that time the new rule is adopted. Despite knowing the length of time required to define and formally release a new rule is substantial, it is still not appropriate to add requirements to the AMC as that would constitute enforcement of a non existing rule. The yaw maneuver working group has recommended that the Terms of Reference be amended to include this new rulemaking task.

2. We consider that for any system that credit is taken (SAS, pedal dampers, etc...) compliance is *independently* shown by meeting the system reliability requirements of Subpart F of the regulations, specifically §27/29.1309 and §27/29.1329 and therefore association of the failure of that system in conjunction with the yaw maneuvers of §27/29.351 is not required. Furthermore, the language of §27/29.351 does not include any wording about conducting the maneuver while the aircraft is in a failed condition. To add requirements to do so is beyond the scope of the rule.

3. We consider association of the failure of a system using a sliding Factor of Safety scale dependent upon the probability of failure of that system in conjunction with the yaw maneuvers of §27/29.351 "rulemaking by AC" or "rulemaking by NPA", since no dedicated "Interaction of Systems and Structure" paragraph (§27/29.302) exists for Rotorcraft.

We trust that adequate information has been included to allow EASA to make a favorable determination in support of our rotorcraft member company consensus comments and recommendations. Should you require any additional information, however, please do not hesitate to contact our offices. AIA appreciates the opportunity to provide this information to you, please contact us at ranee.carr@aia-aerospace.org should you wish to discuss this issue or would like more information.

response *Noted*

1. While recognising that in many cases existing company imposed internal design criteria are fully acceptable, these self imposed standards have exceeded the minimum standards currently stipulated in FAR/CSs. However, in order to provide competitive products, some manufacturers are known to apply the minimum standards and would immediately move to take advantage of any change in interpretation to gain further competitive advantage, at the risk

of reducing safety margins.

The lack of evidence is not justification for a safe condition. The Agency remains concerned that some specific aspects of the demonstration of structural integrity are not fully addressed under the interpretation given in FAA AC. The new AMC has been adapted to align with the current thinking of the rulemaking group in respect of loads at large sideslip angles, and addresses the Agency's concerns. Its adoption is necessary to retain this interpretation in the short-term, prior to the yawing condition working group completing its tasking.

2./3. The new AMC 27/29.351 simply re-words FAA AC 27/29.351 to clarify the intent and avoid misunderstanding. The continued use of text related to system/structure interactions within AC 27/29.351 is a subject for debate within the yawing condition rulemaking group and not directly linked with this NPA.

comment

22

comment by: FAA

We do not concur with EASA Notice of Proposed Amendment (NPA) No 2007-17, Proposal 5, providing additional guidance for CS 27.351 and CS 29.351 for the following reasons:

- 1. The guidance exceeds the current regulatory standard, and therefore sets the defacto compliance standard.
- 2. Issuing the guidance at this time is not in keeping with a previous JAA/FAA agreement to use the advisory guidance for Change 2 of AC 27-1B and AC 29-2C, pending further study.
- 3. Issuing the guidance pre-supposes the outcome of the current EASA study group.

The proposed additional guidance has specific compliance guidance that has no regulatory basis. The regulatory requirement of 14 CFR 27.351 and 14 CFR 29.351 is identical to CS 27.351 and CS 29.351. The proposed additional guidance will require applicants to evaluate requirements not included in the current regulation, requiring an increase in certification substantiation with an associated increase in certification cost. Paragraph 1.a. of the proposed additional guidance states that a suitable combination of sideslip angle and airspeed for the design of components subjected to aerodynamic loads may be obtained with a full rational simulation of the yaw maneuver *extended beyond the sideslip speed envelope specified in the rule* until the rotorcraft reaches the maximum overswing sideslip angle resulting from its motion around the yaw axis. The current rule requires each rotorcraft be designed for loads resulting from specific maneuvers with unbalanced aerodynamic moments about the center of gravity which the aircraft reacts. The rule also specifically states how to produce the required load. The proposed additional guidance establishes a new airworthiness standard, without proper evaluation of cost and safety benefits.

Paragraph 1.b. of the proposed additional guidance provides methodology to investigate the effects of all system failures not shown to be extremely improbable on the loading conditions of CS 27.351 and CS 29.351. Following the methodology, paragraph 1.b.b) may allow a lower factor of safety for compliance with CS 27.305 and CS 29.305 than is required by CS 27.303 and CS 29.303. As stated, the additional guidance applies to all systems, which may be impractical when applied to mechanical systems. The proposed additional guidance establishes a new airworthiness standard that may provide

relief to an existing requirement and establishes new certification requirements without proper evaluation of practicality, cost, and safety benefits.

The advisory guidance for Change 2 of AC 27-1B and AC 29-2C addressing AC paragraph 27.351 and AC paragraph 29.351 is the direct result of an international harmonization yawing working group (YWG) tasked with developing advisory guidance for the regulatory requirements pertaining to yawing conditions. While there was not a consensus agreement, there was an agreement that the YWG would proceed with the majority position as acceptable advisory guidance until a new YWG considered service history and possibly higher-thrust yaw control devices and, if necessary, developed new guidance or proposed new rules.

At this time, the new EASA-chartered YWG is actively pursuing this objective. Consequently, it is premature to arbitrarily publish additional guidance that embraces the minority position when the EASA chartered YWG has not completed their task. The proposed additional advisory guidance has no regulatory basis, nor has it been shown to be a safety concern based on the YWG review of the accident data presented in support of the minority position.

We suggest withdrawing Proposal 5 until such time the current YWG completes their task as previously agreed upon.

response

Not accepted

1. The Agency remains concerned that some specific aspects of the demonstration of structural integrity are not fully addressed under the interpretation given in FAA AC. The new AMC has been developed to align with the current thinking of the yawing conditions rulemaking group in respect of loads at large sideslip angles, and addresses the Agency's concerns. In many cases, existing company imposed internal design criteria are fully acceptable in showing compliance with the new AMC, and are therefore not expected to introduce any additional certification costs on industry. Furthermore, publishing AMC at this time clearly identifies what constitutes an acceptable means of compliance to the Agency, and is intended to avoid issues arising during certification/validation and the associated cost and timescale impacts.

Regarding system/structure interactions, the new AMC 27/29.351 simply re-words FAA AC 27/29.351 to clarify the intent and avoid misunderstanding. The continued use of text related to system/structure interactions within AC 27/29.351 is a subject for debate within the yawing condition rulemaking group and not directly linked with this NPA.

2. The agreement referred to was never ratified by Central JAA or EASA. However, while acknowledging the intent of this agreement, the Agency determined that such a position did not ensure safety margins would be maintained in line with developments in modern helicopters and was inappropriate in the light of recently identified in-service events. The new AMC represents a major step forward towards harmonisation, with common interpretation on some contentious issues, such as the sideslip envelop and resulting sideslip angle, being included. It should be noted that validation of foreign products in Europe would have been problematic without this new interpretation in place.

3. Publishing AMC VLR/27/29.351 at this time is necessary in order to formally adopt FAA AC 27-1B/29-2C Change 2 into the EASA regulatory system. On completion of the yawing condition rulemaking group tasking, the Agency will

review recommendation with the view to fully aligning CS-VLR/27/29 with those recommendations.

comment

23

comment by: *Transport Canada Civil Aviation Standards Branch*

1) Unlike the FAA AC, the AMC does not provide any detailed procedure to achieve the required loading conditions. In the same instant, the AMC contains a statement saying that itself should take precedence over the AC. In brief, the AMC is written mostly to point out the "weaknesss" of the AC without providing a complete procedure (similar to the AC) to show compliance with CS 27/29.351. As a result, based on how it reads, it is unclear to the readers as to whether or not the AC procedure is accepted by EASA as a means of compliance to CS27/29.351?

2) In reference to AMC paragraph (a), the AC, after incorporation of YCWG input, would recognize that 27/29.351 is not appropriate as design requirement for those components that are subjected only to aerodynamic loads. Thus the revised AC would be free of such aforementioned "weakness".

3) As for the issue of interaction of system and structure, it is TCCA opinion that this issue must be made "general design requirement / special condition" similar to CS 25.302. In other words, AC/AMC is not an appropriate home for such a requirement, especially when it applies only to one particular load condition, namely yaw maneuver. Therefore, removal from the AMC this apparent "rule by AC" issue is recommended.

response

Partially accepted

1. This NPA is intended to adopt FAA AC 27-1B Change 2 and AC 29-2C Change 2 as AMC to CS-VLR, CS-27 and CS-29. As such each paragraph is adopted, including those of AC 27.351 and AC 29.351B. The New AMCs (AMC VLR.351, AMC 27.351 and AMC 29.351), are intended to be used with the FAA ACs to provide further guidance and replace acceptable means of compliance where appropriate. As this may have been misinterpreted by TCCA, the wording of the AMCs is strengthened to make this clearer.

2. The AMC will be amended/withdrawn to align with the yawing condition rulemaking group output at a future date when the group has completed its tasking.

3. The new AMC 27/29.351 simply re-words FAA AC 27/29.351 to clarify the intent and avoid misunderstanding. The continued use of text related to system/structure interactions within AC 27/29.351 is a subject for debate within the yawing condition rulemaking group and not directly linked with this NPA.

comment

24

comment by: *Sikorsky*

The following comments represent those made by the Industry representatives of EASA 27&29.003 Yaw Maneuver Working Group and are in response to the Notice of Proposed Amendment (NPA) No 2007-17. The comments are specifically related to Proposal 5 for CS-27 and CS-29.

1. As we agree the current regulations do not address an aerodynamic loads rule for the design of aerodynamic sensitive surfaces we consider

existing company imposed internal design criteria an acceptable MOC. As there is no in-service evidence that suggests a potential safety concern with the current world rotorcraft fleet, we believe there is no urgency to change these criteria until that time the new rule is adopted. Despite knowing the length of time required to define and formally release a new rule is substantial, it is still not appropriate to add requirements to the AMC as that would constitute enforcement of a non existing rule. The yaw maneuver working group has recommended that the Terms of Reference be amended to include this new rulemaking task.

2. We consider that for any system that credit is taken (SAS, pedal dampers, etc...) compliance is *independently* shown by meeting the system reliability requirements of Subpart F of the regulations, specifically §27/29.1309 and §27/29.1329 and therefore association of the failure of that system in conjunction with the yaw maneuvers of §27/29.351 is not required. Furthermore, the language of §27/29.351 does not include any wording about conducting the maneuver while the aircraft is in a failed condition. To add requirements to do so is beyond the scope of the rule.
3. We consider association of the failure of a system using a sliding Factor of Safety scale dependent upon the probability of failure of that system in conjunction with the yaw maneuvers of §27/29.351 "rulemaking by AC" or "rulemaking by NPA", since no dedicated "Interaction of Systems and Structure" paragraph (§27/29.302) exists for Rotorcraft.

response *Noted*

1. While recognising that in many cases existing company imposed internal design criteria are fully acceptable, these self imposed standards have exceeded the minimum standards currently stipulated in FAR/CS requirements. However, in order to provide competitive products, some manufacturers are known to apply the minimum standards and would immediately move to take advantage of any change in interpretation to gain further competitive advantage, at the risk of reducing safety margins.

The lack of evidence is not justification for a safe condition. The Agency remains concerned that some specific aspects of the demonstration of structural integrity are not fully addressed under the interpretation given in FAA AC. The new AMC has been adapted to align with the current thinking of the rulemaking group in respect of loads at large sideslip angles, and addresses the Agency's concerns. Its adoption is necessary to retain this interpretation in the short-term, prior to the yawing condition working group completing its tasking.

2./3. The new AMC 27/29.351 simply re-words FAA AC 27/29.351 to clarify the intent and avoid misunderstanding. The continued use of text related to system/structure interactions within AC 27/29.351 is a subject for debate within the yawing condition rulemaking group and not directly linked with this NPA.

resulting text

AMC 27.351
Yaw manoeuvre conditions
1. Introduction
This AMC provides further guidance and acceptable means of compliance to

supplement FAA AC 27-1B Change 2 (AC 27.351. § 27.351 (Amendment 27-26) YAWING CONDITIONS), to meet the Agency's interpretation of CS 27.351. As such it should be used in conjunction with the FAA AC but take precedence over it, where stipulated, in the showing of compliance.
Specifically, this AMC addresses ...
(Note: Similar changes to CS-29 and CS-VLR are also made)

C. DRAFT DECISIONS - I. Proposals related to CS-27 - Proposal 8: Remove AMC 27.1305 (t) and (u): 2-Minute and 30-Second OEI Power Level p. 14

comment	20	comment by: UK CAA
	<p>Commentor: UK CAA Paragraph: AMC 27.865 4.1 (iii) Comment: The wording differs from the previous MG 12 in that it is applicable for hoist operations only. There may be other operations where time is required to manoeuvre the HEC before a transition to forward flight can be commenced. For example, powerline repair work or fixed strop rescue in a restricted environment. As paragraph (iii) is presently written it would permit these operations to be based on 30 sec power HOGE OEI, which may not give sufficient time for this hover manoeuvring. Justification: See comment above. Proposed Text: "In the case of hoist operations, consideration should also be given to the time required to recover (winch up and bring aboard) or manoeuvre the Class D external load and to transition to forward flight. <u>For example to winch up and bring aboard personnel for hoisting operations or manoeuvre clear of power lines for fixed strop/basket operations.</u> This time increment may limit the use of....."</p>	
response	Accepted	

resulting text

AMC 27.865
Class D (Human External Cargo) for Operations within Europe
...
4.1 (iii) Consideration should also be given to the time required to recover or manoeuvre the Class D external load and to transition into forward flight. For example to winch up and bring aboard personnel in hoisting operations or manoeuvre clear of power lines for fixed strop/basket operations. The time necessary to perform such actions may exceed the short duration OEI power ratings. For example, for a helicopter with a 30sec/2 min rating structure that sustains an engine failure at a height of 40 feet, the time required to re-stabilise in a hover, recover the external load (given the hoist speed limitations), and then transition to forward flight (with minimal altitude loss) would likely exceed 30 seconds and a power reduction into the 2 minute rating would be necessary.

comment

12 ❖

comment by: Christian Giry - Eurocopter

"b. Interaction of System and Structure"

This is a clearer rewording of the AC-27/29.351 corresponding part addressing the failure of the yawing limiting devices. This rewording should avoid misinterpretations and is fully supported by EC. However, FAA and EASA have basically no divergence on this aspect and it would seem preferable to amend the ACs wording rather than introduce an additional AMC.

response

Noted

Since the FAA ACs are now published, no change in their wording is now possible. Only through additional EASA AMC can clarification be provided in the short-term.

comment

16 ❖

comment by: Christian Giry - Eurocopter

"this standard may not necessarily be adequate for the design of rotorcraft structural components that are principally subjected in flight to significant aerodynamic loads":

The intent seems to apply new higher standards for primarily aerodynamically loaded structural components. In that case the rule itself should be changed. Ruling by AMC would not be acceptable.

"In lieu of acceptable design criteria developed by the applicant, a suitable combination of sideslip angle and airspeed for the design of rotorcraft components subjected to aerodynamic loads may be obtained from a full rational simulation of the yaw manoeuvre of CS 27.351 extended, beyond the sideslip-speed envelope specified in the rule, until the rotorcraft reaches the maximum overswing sideslip angle resulting from its motion around the yaw axis.":

What is clearly required by this AMC is to substantiate the components that are subjected to aerodynamic loads in a wider sideslip envelope than the tailboom, whereas those components are not as critical as the tailboom is. This does not seem to be consistent.

response

Not accepted

One of the difficulties previously encountered in trying to provide a common interpretation of AC 27/29.351 was the lack of clarity within the rule itself and whether transient angles greater than the line should be included or omitted from the analysis. Transient angles will have a significant impact on the aerodynamic loads that might directly design some components, the failure of which could also be flight critical (e.g. fin). For components designed by a combination of thrust, inertia and aerodynamic loads (e.g. tailboom), the yawing conditions working group has found that the FAA AC provides an adequate envelop for the design of such components, and the Agency concurs.

The AMC text has been amended to be non-prescriptive and to provide further clarification. Future developments within the yawing condition rulemaking group will determine how and to what extent aerodynamic loading will be regulated.

comment 18 ❖ comment by: *Christian Giry - Eurocopter*

"a. Aerodynamic Loads":
 EC disagree with this proposal for the following reasons developed in other comments:

- no real safety justification
- establishing by AMC of a new design standard more stringent than required by existing rules
- action taken without waiting for the 27&29.003 study group outcome

response *Not accepted*

As previously stated, the proposal simply reflects the Agency's interpretation of the existing rule. (See also response to comments #10 and #11)

comment 19 ❖ comment by: *Christian Giry - Eurocopter*

EC position:
 Propose to delete paragraph AMC 27/29.351 Yaw manoeuvre conditions.
 Reasons:
 For area a. Aerodynamic Loads, see comment 18.
 For area b. Interaction of System and Structure, see comment 12 (non controversial issue, may wait for FAA/EASA harmonisation).

response *Not accepted*

For a) see response to comment 18
 For b) The interaction of system/structures is still in fact a controversial issue within the yawing condition rulemaking group. There is an opinion, supported by the FAA, that the whole text should be deleted from AC 27/29.351. As stated by EC in comment 12, the new text is a clearer rewording, should avoid misinterpretation and is fully supported by EC. It is therefore appropriate to retain the text in the new AMC pending further discussion and consensus being reached within the rulemaking group.

C. DRAFT DECISIONS - III. Proposals related to CS-VLR - Proposal 2: Amend AMC VLR General p. 18

comment 4 comment by: *Francis Fagegaltier Services*

AMC VLR General
 It is supposed that CS-VLR was created on the assumption that CS-27 was too much demanding for such light rotorcraft. There is no FAR VLR. Then, is it correct to impose all FAR 27 advisory circulars to the very light rotorcraft ? This does not seem to be consistent with the initial intent.

response *Noted*

FAA AC-27 has been adopted as the basis for AMC to CS-VLR. CS-VLR book 2, also includes AMC specifically developed for this category of rotorcraft and is more extensive than book 2 of either CS-27 or CS-29. The reliance on FAA AC 27 is indicative of the relatively new nature of this CS. It is expected that further AMC specific to CS-VLR will be developed as certification experience is gained.

comment 7 comment by: *Francis Fagegaltier Services*

FADEC
 The FAA ACs, which are proposed for automatic adoption by this NPA, contain texts related to the engine FADEC (noted AC 27 MG 4 and AC 29 MG 4 in the appendix of the NPA).

It appears that the contents of these ACs are not consistent with the very recently published amendment 1 to CS-E on this very subject. This part of the FAA ACs should not be adopted by EASA.

response *Partially accepted*

As indicated in the response to comment #1, there was no automatic adoption of FAA AC. As part of the EASA rulemaking group activity leading to this NPA, all changes introduced by FAA AC 27-1B/29-2C Change 2 were reviewed, including those related to MG 4.

Following receipt of this comment, a further internal review of MG4 has taken place and it has been concluded that the guidance material is both useful and valid, being based on previous certification experience. However, it has been recognised that MG4 in its previous version (and unchanged in this revision), reflects FAA procedures and not those of the Agency. To avoid misunderstanding, it is therefore proposed to add a note in the form of a new AMC MG4 to book 2 of CS-27 and CS-29.

resulting text

AMC MG4
Full Authority Digital Electronic Controls (FADEC)
Note: Certification procedures identified in MG4 refer specifically to the FAA regulatory system. For guidance on EASA procedures, reference should be made to Commission Regulation (EC) No 1702/2003 (as amended) (Part-21), AMC-20 (and specifically AMC 20-1 and 20-3) and to EASA internal working procedures, all of which are available on EASA's web site: <http://www.easa.europa.eu/>.