European Union Aviation Safety Agency

Explanatory Note to Decision 2021/010/R

Installation and maintenance of recorders — certification aspects

Human factors in rotorcraft design

CS-27 Amendment 8 | CS-29 Amendment 9

RELATED NPA/CRD: 2019-12 — RMT.0249 (MDM.051) | RELATED NPA/CRD: 2019-11 — RMT.0713

EXECUTIVE SUMMARY

The objective of this Decision is to:

— improve the availability and quality of data recorded by flight recorders in order to better support safety investigations of accidents and incidents involving large rotorcraft; and

— reduce the risk of design-related human factors (HFs) errors that may lead or contribute to an accident or incident.

This Decision amends:

— CS-29 to:

  — provide certification specifications (CSs) and acceptable means of compliance (AMC) for flight recorders performing the data link recording function,

  — introduce in the AMC for flight recorder installations new sections explaining what kinds of failures should be addressed by the applicants when developing the instructions for continued airworthiness (ICAs),

  — introduce in AMC 29.1457 a new section explaining how to perform evaluations of cockpit voice recorder (CVR) recordings, and

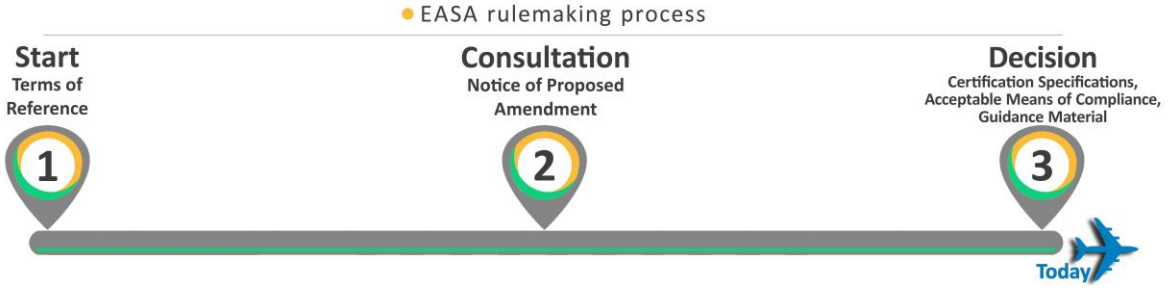
  — amend CS 29.1457 for CVRs to allow the use of more than four channels;

— CS-27 and CS-29 to introduce specific requirements (i.e. CS 27/29.1302) to ensure that HFs are systematically taken into account during the design and certification process of rotorcraft cockpits.

The amendments related to 29.1457 of CS-29 are expected to increase safety without any significant economic impact, and with no environmental or social impact. They will also support large rotorcraft operators in ensuring the serviceability of flight recorders, streamlining the CS-29 certification process, thereby providing an economic benefit for large rotorcraft operators, CS-29 certification applicants, and EASA.

The amendments related to 27/29.1302 of CS-27 and CS-29 are expected to moderately increase safety, as compliance with the new CSs is expected to reduce the probability of HFs and pilot workload issues leading to an accident or incident.

Domains:	Aircraft tracking, rescue operations and accident investigations; rotorcraft operations; HFs		
Related rules:	CS-27; CS-29		
Affected stakeholders:	Rotorcraft manufacturers, large rotorcraft operators and maintenance organisations; accident investigation bodies		
Driver:	Safety	**Rulemaking group:**	No
Impact assessment:	Yes	**Rulemaking Procedure:**	Standard



RMT.0249 (MDM.051): 27.1.2016	**13.11.2019**	**14.6.2021**
RMT.0713: 31.8.2018	**24.10.2019**	

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1. About this Decision

The European Union Aviation Safety Agency (EASA) developed Decision 2021/010/R in line with Regulation (EU) 2018/1139[1] (the 'Basic Regulation') and the Rulemaking Procedure[2].

This rulemaking activity is included in the European Plan for Aviation Safety (EPAS) for 2021–2025[3] under rulemaking tasks RMT.0249 (MDM.051) and RMT.0713. The scope and timescales of the tasks were defined in the related Terms of Reference[4].

The *draft* text of this Decision has been developed by EASA. All the interested parties were consulted through Notices of Proposed Amendments (NPAs) 2019-11 'Human factors in rotorcraft design'[5] and 2019-12 'Installation and maintenance of recorders — certification aspects'[6], and comments were received from all the interested parties, including industry, national aviation authorities (NAAs) and social partners.

Table 1 provides an overview of the number of comments received during the related public NPA consultations.

Table 1

NPA #	Related RMT	# of commentators	# of comments received	Related CRD
NPA 2019-12	RMT.0249 (MDM.051)	17	93	CRD 2019-12
NPA 2019-11	RMT.0713	17	203	CRD 2019-11

The comments received, and EASA's responses to them, are presented in the Comment-Response Documents (CRDs) referred to in Table 1 above.

1 Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1535612134845&uri=CELEX:32018R1139).

2 EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure).

3 https://www.easa.europa.eu/document-library/general-publications/european-plan-aviation-safety-2021-2025

4 RMT.0249 (MDM.051): https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0249-mdm051
RMT.0713: https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0713

5 https://www.easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2019-11

6 https://www.easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2019-12

The *final* text of this Decision with the certification specifications (CSs) and acceptable means of compliance (AMC) has been developed by EASA taking into consideration the comments received during the public NPA consultations.

The major milestones of this rulemaking activity are presented on the title page.

2. In summary — why and what

2.1. Why we need to amend the CSs, AMC and GM

RMT.0249 (MDM.051): Installation and maintenance of recorders — certification aspects

Data link recording

Point CAT.IDE.H.195 of Annex IV (Part-CAT) to Commission Regulation (EU) No 965/2012[7] contains requirements on the recording of data link messages on a flight recorder for aircraft manufactured as from April 2014 and under certain conditions.

However, in CS-29, there are no corresponding certification specifications for the installation of a data link recording function. As a temporary measure, EASA developed a generic certification review item (CRI) on the subject 'flight recorders and data link recording' that provides a Special Condition and Interpretative Material.

The serviceability of flight recorders

Maintenance instructions

Safety investigation authorities have reported several cases where the flight data recorder (FDR) or the cockpit voice recorder (CVR) did not correctly record data due to a malfunction of the unit or of the dedicated equipment (including sensors and transducers). Such failures may remain hidden for a certain period of time as the serviceability of flight recorders encompasses the quality of the recorded data which cannot currently be automatically assessed.

Point CAT.GEN.MPA.195(b)) of Annex IV (Part-CAT) to Commission Regulation (EU) No 965/2012 requires aircraft operators to conduct operational checks and evaluations of flight recorder recordings in order to ensure their 'continued serviceability'. Consistently with the standards of ICAO Annex 6 Part I Appendix 8, and of Part III Appendix 4, AMC1 CAT.GEN.MPA.195(b) recommends several scheduled tasks for aircraft operators to comply with this requirement.

In practice, the content and the level of detail of the maintenance instructions for a flight recorder system vary from one installation to another, resulting in inconsistent maintenance practices among aircraft operators.

Conversion of FDR raw data into flight parameters expressed in engineering units

Safety investigation authorities have also found various cases where the information necessary to convert the FDR raw data into parameters expressed in engineering units, as provided by the type certificate (TC) or supplemental type certificate (STC) holder, was incomplete or inaccurate. As a result, the analysis of the FDR raw data was significantly delayed. Point CAT.GEN.MPA.195(d) requires aircraft operators to 'keep and maintain up-to-date documentation that presents the necessary information to convert FDR raw data into

[7] Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R0965&qid=1617891703371).

parameters expressed in engineering units'. However, an aircraft operator can only do that if the TC or STC holder has provided the corresponding information to the aircraft operator.

The quality of cockpit voice recorder (CVR) recordings

Safety investigation authorities have found that some CVR system installations do not provide the expected quality for cockpit area microphones (CAMs) and other audio channels. The issues identified include the following:

(a) poor quality of the recording on the CAM channel;

(b) saturation of the recording on the CAM channel by very low frequency vibrations;

(c) excessive electrical background noise on a channel;

(d) signals from the channels of flight crew members cancelling each other out;

(e) clipping of the signals on the channels of flight crew members when coming from the oxygen mask microphones;

(f) superimposition of microphone signals by radio reception signals;

(g) inversion of the sign of the signal coming from the CAM channel, resulting in significant attenuation; and

(h) incorrect allocation of the recording capacity to a channel.

These issues seem to be recurrent because of the lack of a framework for demonstrating the audio quality of a CVR system installation. Indeed, many factors potentially affecting the quality of the recorded audio cannot be addressed at the equipment level, such as the effects of components of the audio system (e.g. headsets), the air circulation in the vicinity of microphones (due to air-conditioning systems), vibrations during the flight, electromagnetic interference, etc.

As a temporary measure, EASA had initially reacted by issuing in June 2012 Certification Memorandum CM-AS-001 'Quality of Recording of Cockpit Voice Recorders'[8].

RMT.0713: Human factors in rotorcraft design

Human factors (HFs) may contribute either directly or indirectly to aircraft accidents and incidents. Already today, the design of a cockpit and its systems can strongly influence the performance of the flight crew and the potential for flight crew errors. Currently, the Certification Specifications for Small and Large Rotorcraft (CS-27 and CS-29) do not contain any specific requirements for a HFs assessment of the design of the cockpit and the associated systems, while such requirements were introduced into the Certification Specifications for Large Aeroplanes (CS-25) around 14 years ago.

Additionally, new generations of rotorcraft are characterised by having a high level of integration of cockpit equipment, displays, controls and automation. It is also likely that future rotorcraft projects embodying, for instance, fly-by-wire technology flight controls that include enhanced piloting control laws, will pose new and additional challenges from a HFs perspective.

8 https://www.easa.europa.eu/document-library/product-certification-consultations/easa-cm-001

2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of the Basic Regulation. This Decision will contribute to the achievement of the overall objectives by addressing the issues outlined in Section 2.1.

The specific objectives of this Decision are presented below.

RMT.0249 (MDM.051): Installation and maintenance of recorders — certification aspects

The specific objective is to improve the availability and quality of the data recorded by flight recorders in order to better support safety investigation authorities in the investigation of accidents and incidents involving large rotorcraft. This includes, in particular:

(a) the provision of certification specifications and acceptable means of compliance to support rotorcraft operator compliance with the operational rules requiring the recording of data link communications;

(c) the improvement of the serviceability of FDRs; and

(d) the improvement of the audio quality of CVR recordings.

RMT.0713: Human factors in rotorcraft design

The specific objective is to ensure that HFs are systematically taken into account during the design and the certification process of rotorcraft cockpits.

The availability of CSs for HFs in relation to the designs of new rotorcraft cockpits is expected to reduce the risk of design-related HFs errors and to provide for a HFs assessment of the design of the cockpit and the associated systems.

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

RMT.0249 (MDM.051): Installation and maintenance of recorders — certification aspects

Data link recording

New CS and AMC are introduced for recorders performing the data link recording function: CS and AMC 29.1460.

The serviceability of flight recorders

Introduction in AMC 29.1457, AMC 29.1459 and AMC 29.1460 of new sections explaining what kinds of failures should be addressed by the applicants when developing the instructions for continued airworthiness (ICAs).

The quality of CVR recordings

Introduction in AMC 29.1457 of a new section explaining how applicants are expected to perform evaluations of CVR recordings.

CS 29.1457 is also amended to allow the use of more than four channels.

RMT.0713: Human factors in rotorcraft design

This Decision amends CS-29 and CS-27 by introducing:

— a new requirement covering CSs for a HFs assessment of all installed equipment intended for use by flight crew members (refer to CS 27/29.1302), and

— AMC and GM containing explanations and guidance to support rotorcraft operator compliance with the new requirement mentioned above.

These new CSs, AMC and GM have been drafted starting from the existing CS 25.1302 and the associated AMC 25.1302. Although derived from large aeroplanes, the HFs principles applied to cockpit and system designs have been found to be relevant to all aircraft types, including the new generation of complex rotorcraft.

While the text of CS 27/29.1302 is substantially identical to the text of CS 25.1302, AMC 25.1302 has been significantly restructured and reworded in order to adapt it to the different types of operations and the related operational scenarios which could be performed by rotorcraft. Additionally, some improvements and clarifications have been introduced on the basis of the experience gained and lessons learned during recent certification projects for large aeroplanes.

The main differences between AMC 25.1302 and AMC 27/29.1302 are listed hereafter:

— The existing material has been restructured. All the informative elements and some explanatory material have been moved to new GM1 27/29.1302.

— Several clarifications have been made throughout the text.

— Simplifications for the demonstration of compliance of certain types of rotorcraft, and related changes, have been made to render them more proportionate (refer to paragraph 3.2.9).

— A new figure has been introduced to show the methodical approach to the certification for design-related HFs issues (refer to paragraph 3.1).

— The new ‘level of involvement (LoI)’ concept (refer to points 21.A.15(b)(5) and (6) of Part 21) has been reflected wherever the involvement of EASA was described.

— The certification strategy has been clarified and expanded (refer to paragraph 3.3.1).

— Methodological considerations applicable to HFs assessments, including scenario-based approaches, have been added (refer to paragraph 3.3.2).

— Some definitions have been reworded and adapted to the rotorcraft domain, and new definitions have been added.

— A paragraph has been added in Section 5 to provide guidance regarding the possibility to take some credits for compliance demonstration from previous compliance certification processes.

— Additional clarifications have been added in Section 5 in order to describe the main criteria to be considered while assessing the representativeness of the test articles used during compliance demonstration.

As a result, the proposed AMC 27/29.1302 provides a more streamlined approach towards the demonstration of compliance with CS 27/29.1302.

A practical example of the minimum information which should be included in the compliance matrix related to CS 27/29.1302 is provided in the new GM2 27/29.1302.

Proportionate implementation

The purpose of this rulemaking task is to provide an effective and proportionate set of amendments to CS-27/29 that address HFs in rotorcraft designs.

The first level of proportionality is, de facto, embedded in the process itself because the level of scrutiny is determined by assessing the novelty, complexity and level of system integration. Therefore, the demonstration of compliance with CS 27/29.1302 for simple rotorcraft, or for simple changes to rotorcraft, will trigger a low level of scrutiny.

Additionally, some simplifications have been made to paragraph 3.2.9 of both AMC 29.1302 and 27.1302 to facilitate the demonstration of compliance for simpler rotorcraft and for non-significant changes to them.

2.4. What are the stakeholders' views

RMT.0249 (MDM.051): Installation and maintenance of recorders — certification aspects

Overall, the draft proposal was welcomed by the majority of the commentators whose comments allowed the improvement of the CS-29 text.

However, some industry representatives raised concerns that some tasks mentioned in the proposed AMC sections dealing with flight recorder ICAs may increase maintenance costs for some rotorcraft operators. The wording used by EASA in these sections was also sometimes considered too prescriptive. One aeroplane manufacturer suggested to rely on the MSG-3 methodology (used to develop Maintenance Review Board (MRB) reports), or equivalent, to identify the required maintenance tasks for failures or faults that are not apparent to the flight crew (e.g. with flight deck indications).

EASA reminds that the objective is to support rotorcraft operators by providing them with the adequate means to comply with existing ICAO Annex 6 standards and the EU Air Operations Regulation. EASA also wishes to remind that the MSG-3 methodology is not able to identify some required recorder maintenance tasks because of the criteria used in the method (safety effect assessment).

Taking into account these concerns, the ICAs section of the AMC has been revised to ensure that it does not prescribe maintenance tasks. It now recommends that the ICAs address the failures that may affect the correct functioning of the flight data recorder system or the quality of the recording; examples of failures are also provided.

For further information, please refer to CRD 2019-12[9] which contains individual responses to the stakeholder comments.

[9] https://www.easa.europa.eu/document-library/comment-response-documents/crd-2019-12

RMT.0713: Human factors in rotorcraft design

Overall, the draft proposal was welcomed by the majority of the commentators whose comments allowed the improvement of the draft text. The majority of the comments were focused on the proposed AMC 27/29.1302.

The nature of the comments received ranged from specific technical comments to observations aiming to improve the wording.

Hereafter is a summary of the main comments received and of the most significant amendments introduced following the public consultation; however, it does not represent an exhaustive list.

Additional workload for applicants

Some commentators expressed their concern regarding the additional workload that could be required for the demonstration of compliance with the new CS 27/29.1302.

EASA believes that, although a specific requirement is not currently present in CS-27/CS-29, HFs are already taken into consideration during the design of human–machine interfaces. The introduction of 27/29.1302 will rather provide for a systematic approach for such considerations to be performed and to ensure their effectiveness. Additionally, it has to be considered that CRIs have been systematically issued for the certification of new products for many years. Therefore, although an additional effort in the demonstration of compliance might be foreseen, according to EASA, this additional effort will be compensated by reducing the risk of certifying products, or changes to products, with unidentified HFs issues. In fact, if such HFs issues are discovered during operation, they might require a very expensive redesign of the rotorcraft.

Harmonisation with EASA's bilateral partners

Some commentators submitted comments focusing on the lack of harmonisation with EASA's bilateral partners, such as the FAA and TCCA.

Although it is confirmed that the publication of CS 27/29.1302 will introduce a sort of misalignment between the EASA regulatory framework and that of the FAA or the TCCA, it should be noted that a preliminary consultation with stakeholders, including counterparts such as the FAA and TCCA, was performed before proceeding with the public consultation of NPA 2019-11. As an outcome, no fundamental disagreements on the objective and overall principle of this rulemaking task were recorded during this consultation.

Additionally, coordination meetings with the FAA have been conducted after the public NPA consultation to ensure proper understanding and addressing the comments submitted by the FAA. As a result, the majority of the FAA comments have been accepted thus potentially facilitating harmonisation with the future amendments to the FARs.

Complexity of the compliance material

Some commentators submitted comments focusing on the complexity and the length of the proposed material.

Considering these comments, the material has been further simplified. Several clarifications have been added and redundant parts have been deleted.

Definition of 'crew member'

Some commentators proposed to extend the definition of 'crew member' in order to include also maintenance personnel, while other commentators suggested to limit the proposed definition to pilots only, thus excluding operators in the cabin.

While the proposal to extend the applicability of CS 27/29.1302 to maintenance personnel has not been accepted as this rulemaking task is focusing on the design of systems and equipment to be used by the crew. EASA introduced some clarifications regarding the scope of CS 27/29.1302, thus improving the definitions of 'cockpit' and 'crew members'.

Applicability to changes to the cockpit design

Some commentators expressed their concern regarding the applicability of CS 27/29.1302 to changes since, according to their opinion, this new certification specification could significantly increase the workload necessary to demonstrate compliance of the changes affecting the cockpit design.

EASA confirms that the new requirement will be applicable also to changes; however, the additional workload is not considered as major. In fact, the new HFs requirements already contain an embedded form of proportionality as the effort needed to demonstrate compliance is proportionate to the level of complexity/integration and novelty of the design. Additionally, the AMC contains some alleviations, on the level of effort needed to demonstrate compliance, which relate to changes (see AMC 27/29.1302 paragraph 3.2.9).

Proportionality

Some commentators misunderstood the proportionality requirements that EASA proposed in NPA 2019-11 (refer to AMC 27/29.1302 paragraph 1.2(d)). In some cases, this paragraph was considered as contradicting or overlapping the requirements related to the definition of 'certification basis' contained in Annex I (Part 21) to Regulation (EU) No 748/2012.

EASA appreciates that the proposed wording could have been misunderstood; therefore, it has been clarified that the aim of the commented paragraph was to provide some proportionate alleviations for the demonstration of compliance and not to affect the determination of the certification basis that, as properly mentioned in the comments, is defined according to Part 21.

To avoid such incorrect interpretation, the paragraph dealing with proportionality has been completely reworded and moved to new paragraph 3.2.9.

Baseline for the determination of the novelty of the design

Some commentators expressed their disagreement regarding the fact that the assessment of novelty of a design item should be conducted taking into account the certification basis of a previously approved reference product.

EASA recognises that the certification basis of a reference product could play a role only when the demonstration of compliance is performed, e.g. providing the possibility to reuse entirely or partially the demonstration of compliance performed in the past.

Nevertheless, the certification basis of the reference product does not play an active role in the determination of the novelty (or other characteristics) of the design item to be assessed.

As a result, the AMC has been reworded and the determination of the level of novelty is not based any more on the certification basis of the reference product considered to determine the novelty. As a matter of fact, the novelty is now to be determined only in relation to the characteristics of the design features under examination.

However, the certification basis of the reference product could play a role when the applicant decides to take credits from the related demonstration of compliance (see AMC 27/29.1302 paragraph 5.3.1). This approach is in line with the procedures normally used in certification.

Is novelty considered a master criterion?

Some commentators proposed to consider the novelty as a sort of master criterion to the definition of the level of scrutiny. According to them, if a design item is not novel, then a 'normal' level of scrutiny is to be applied during the demonstration of compliance whereas if a design item is novel, then the other two criteria (level of integration and complexity) should be assessed to determine the level of scrutiny.

EASA does not concur with the described interpretation and confirms that the three criteria mentioned above should be considered as equally relevant to the determination of the level of scrutiny.

Level of scrutiny for design items that are not complex/novel nor integrated

Some commentators reported some misunderstandings regarding the level of scrutiny to be applied to design items that are not novel nor complex nor integrated.

EASA clarifies that all the design items under analysis are expected to be scrutinised. If none of the criteria mentioned above is met, the related design item is candidate for a low level of scrutiny.

Additionally, the level of scrutiny performed by the applicant should be proportionate to the number of the above criteria which each design item meets.

(Early) involvement of EASA

Some commentators submitted comments regarding the AMC suggestion to ensure the early involvement of EASA in the projects. In some cases, this early involvement was considered to contradict the new concept of level of involvement (LoI) (see point 21.B.100 of Part 21).

EASA has reviewed the initial proposed text of AMC 27/29.1302 discussing the involvement and some paragraphs have been deleted or reworded.

In general, both parties may have an interest in authority early involvement, as the authority is continuously gaining experience and confidence in the HFs process and the compliance of cockpit designs. Some of the activities conducted with the involvement of EASA in this early phase might be later on recognised as part of the compliance demonstration to the certification basis. Additionally, potential issues may be identified early on by following this approach, thus reducing the risk of a late redesign of features that may not be acceptable to EASA.

Qualification of CS-27 pilots

Some commentators expressed their concern regarding the fact that, for the demonstration of compliance, the applicant shall assume that the rotorcraft is operated by qualified flight crew members that are trained in the use of the installed equipment. While this is not an issue when a CS-29 rotorcraft is to be assessed, some difficulties could arise when a CS-27 rotorcraft is to be assessed. In fact, according to the FAA licensing system for instance, the 'training' in a form of a type rating is not required for small rotorcraft.

Although EASA recognises this issue, it should be noted that the problem of the different rules for crew qualification between the FAA and EASA cannot be solved at the level of this AMC. Most likely this regulatory difference will be identified as significant standard difference (SSD). In this respect, it should be noted that flight crew training is essentially mentioned within this material in order to guarantee that the evaluation is made by personnel that know the system under evaluation to the extent that there is no bias due to the lack of familiarity.

Credit from previous compliance certification processes

Some commentators asked for additional guidance regarding the possibility to take certain certification credits from previous demonstration of compliance.

Given the complexity of this subject and the number of variants, EASA is convinced that it is rather impossible to provide precise details regarding the level of credits that an applicant could take from previous projects. However, to provide further clarity, a new paragraph has been created (refer to paragraph 5.3.1 in AMC 27/29.1302) in order to discuss the main criteria to be considered when certain certification credits from previous projects are claimed.

Description of the means of compliance

In order to accommodate commentators' requests to simplify and rationalise the wording of the AMC 27/29.1302, EASA has performed an in-depth review of the proposed Section 5 'Means of compliance'. As a result, this paragraph has been simplified and significantly reworded. Several repetitions have been deleted and some clarifications added.

Additionally, a new paragraph has been introduced to describe the main considerations to be applied when assessing the representativeness of a test article used during compliance demonstration; refer to paragraph 5.3.2 in AMC 27/19.1302.

2.5. What are the benefits and drawbacks

RMT.0249 (MDM.051): Installation and maintenance of recorders — certification aspects

Data link recording

The new CS and AMC 29.1460 will bring economic benefits for both applicants and EASA as it will facilitate the certification process. A more robust set of specifications will ensure that data link recording system designs have an adequate level of integrity to ensure the availability of data link recording after an accident or incident, which will bring benefits for accident and incident investigations, thus improving safety.

The serviceability of flight recorders

The amendments to the various AMC, corresponding to the specifications for recorder installations, will bring a safety and economic benefit over the current situation where some accident investigations are hindered because of missing or unusable recorded data.

The quality of CVR recordings

The amendments to AMC 29.1457 will bring a safety and economic benefit over the current situation. It will, overall, ensure that the audio quality of a CVR is thoroughly investigated and reported before it is certified. This will bring benefits to operators, aircraft accident investigation bodies, EASA, and design organisations.

RMT.0713: Human factors in rotorcraft design

Safety impacts

The design and certification phase of a new or modified rotorcraft is the most appropriate time to address the effects of crew workstation features and characteristics on the performance of the flight crew, and to tackle any shortfalls that have the potential to induce errors or contribute to flight crew poor performance.

Regarding those accidents or incidents for which HFs shortfalls in the design of rotorcraft were considered to be the root cause, it is expected that the new CSs will help to significantly reduce the probability of such accidents occurring. The new CSs will also provide a better tool and basis for design organisations and EASA to deal with the increased level of complexity and integration that is expected in rotorcraft in the years to come.

For other accidents or incidents for which HFs shortfalls in the design of rotorcraft have been identified as a contributing factor, it is expected that there will be a significant positive impact on safety. In fact, the main objective of CS 27/29.1302 is to reduce the risk of design-related HF errors.

Considering the above, an appreciable safety benefit is expected from the introduction of the new CSs in comparison with the current situation.

Economic impacts

The introduction of new CS 27/29.1302 will contribute to the improvement of the efficiency of the certification process. A structured approach will be available upfront, with no need to adapt the

existing CS-25 material through the issuance of project-related certification review items (CRIs), as has been the case for recent CS-29 large rotorcraft projects.

The introduction of new CS 27/29.1302 for HFs assessments is not expected to significantly increase the costs for the industry due to the fact that HFs assessments have already been performed for the majority of recent rotorcraft certification projects, based on project-related CRIs.

The availability of CS 27/29.1302 for HFs from the start of the certification process may even lead to cost savings. This is due to the fact that the applicant will clearly be aware upfront of what is required for the rotorcraft to be certified. The applicant may, therefore, be able to better plan the certification project, and discussions with EASA may be facilitated.

Where project-related special conditions have not been systematically issued in the past, e.g. for some CS-27 small rotorcraft, there will be an higher impact on cost. The increased costs for these rotorcraft may, however, outweigh the risk of certifying them with unidentified HFs issues. If such HFs issues are discovered during operation, they may require a very expensive redesign of the rotorcraft. In order to limit potential additional costs, EASA has introduced a proportionate approach for the application of CS 27.1302.

For simpler certification cases, appropriate alleviations have been included in the AMC (refer to paragraph 3.2.9). Refer also to Section 2.3 above.

Conclusion

The amendments issued by this Decision are expected to provide an appreciable safety benefit, would have no social or environmental impacts, would not have a major impact on certification costs, and would streamline the certification process.

3. How do we monitor and evaluate the rules

RMT.0249 (MDM.051): Installation and maintenance of recorders — certification aspects

The monitoring by EASA of the effects created by Amendment 9 to CS-29 will consist of:

(a) the experience gained by EASA from future CS-29 type-certification projects in the field of flight recorder installations; and

(b) in the long term, the trend of the issues encountered with flight recorders during investigations of accidents and incidents, as well as other feedback received from rotorcraft operators and oversight authorities.

Item (a) depends on the applications received after Amendment 9 to CS-29. A review could not be performed earlier than 5 years after the date of applicability of Amendment 9 to CS-29, and it would require the availability of experience gained from several certification projects for each type of aircraft.

Item (b) would be available once the new type designs have entered into service and have been operated for a sufficient amount of flight time, which would require several years (at least 5 years to obtain statistically relevant information).

RMT.0713 Human factors in rotorcraft design

The new CS 27/29.1302 shall be assessed by EASA based on the experience gained from CS-27/CS-29 certification projects after Amendment 8/9, via the monitoring ensured in the context of the usual continuing airworthiness process followed by EASA and type-certificate holders, and also through the investigations of occurrences and safety recommendations from safety investigation authorities.

4. References

4.1. Related decisions

— Decision No. 2003/15/RM of the Executive Director of the Agency of 14 November 2003 on certification specifications for small rotorcraft (« CS-27 »)

— Decision No. 2003/16/RM of the Executive Director of the Agency of 14 November 2003 on certification specifications for large rotorcraft (« CS-29 »)

4.2. Other reference documents

— ICAO Annex 6, Part I (Eleventh Edition, July 2018 – incorporating Amendments 1 to 43), Appendix 8, Section 1 (General requirements) and Section 7 (Inspections of flight recorder systems)

— ICAO Annex 6, Part III (Ninth Edition, July 2018– incorporating Amendments 1 to 22), Appendix 4, Section 1 (General requirements) and Section 6 (Inspections of flight recorder systems)

— EUROCAE Document ED-93 (dated November 1998), 'Minimum aviation system performance specification for CNS/ATM message recording systems'

— EUROCAE Document ED-112A (dated September 2013), 'Minimum operational specification for crash protected airborne recorder systems'

5. Related documents

— CRD 2019-12 ‘Installation and maintenance of recorders — certification aspects’ (RMT.0249 (MDM.051))[10]

— CRD 2019-11 ‘Human factors in rotorcraft design’ (RMT.0713)[11]

10 https://www.easa.europa.eu/document-library/comment-response-documents/crd-2019-12

11 https://www.easa.europa.eu/document-library/comment-response-documents