European Union Aviation Safety Agency

Explanatory Note to Decision 2023/001/R

Enhancement of the safety assessment processes for rotorcraft designs

and

Regular update of the Certification Specifications for Small Rotorcraft (CS-27), and Large Rotorcraft (CS-29)

RELATED NPAS: 2021-11 (RMT.0712) AND 2022-01(RMT.0128)

EXECUTIVE SUMMARY

The objectives of this Decision are to:

— provide proportionate and cost-efficient rules in the field of the safety assessment provisions for equipment, systems and installations for rotorcraft that also maintain an overall high level of safety;

— reflect the state of the art of small and large rotorcraft certification based on experience gathered from in-service occurrences and certification projects.

To achieve these objectives, this Decision amends the Certification Specifications and Acceptable Means of Compliance for Small Rotorcraft (CS-27) and the Certification Specifications and Acceptable Means of Compliance for Large Rotorcraft (CS-29) to introduce:

— amendments to the CSs related to the safety assessment of equipment, systems, and installations along with AMC that introduces proportionality into the safety objectives for small CS-27 rotorcraft;

— certification provisions and guidance material for which sufficient experience has been gained through certification (e.g. they were included in Certification Memoranda, equivalent safety findings, special conditions) or that were necessary to address Safety Recommendations.

The amendments are expected to:

— provide greater proportionality for the safety objectives for small CS-27 rotorcraft, thereby also promoting the installation of equipment and technology that could improve safety;

— increase the harmonisation of the EASA safety assessment provisions for rotorcraft contained in CS 27.1309 and CS 29.1309 with other EASA CSs (and SCs) and with their FAA equivalents;

— address safety concerns that have been identified, and increase the utility and relevance CS-27 and CS-29.

The amendments will have no significant economic impact, and no environmental or social impacts.

Domain:	Design and production
Related rules:	CS-27 and CS-29
Affected stakeholders:	rotorcraft manufacturers and other design organisations dealing with supplemental type certificates (STCs), repairs or changes to rotorcraft
Driver:	Efficiency/proportionality and Safety
Rulemaking group:	No
Impact assessment:	Detailed (RMT.0712)/light (RMT.0128)

EASA rulemaking procedure milestones

	Start Terms of Reference	**Public Consultation** NPA 2021-11 and NPA 2022-01	**Proposal to the Commission** Opinion	**Adoption by Commission** Implementing/Delegated act	**Decision** CSs, AMC, GM
RMT.0712	15.10.2018	26.10.2021	N/A	N/A	7.2.2023
RMT.0128	28.9.2016	14.2.2022	N/A	N/A	

Table of contents

1. About this Decision

The European Union Aviation Safety Agency (EASA) developed Decision 2023/001/R in line with Regulation (EU) 2018/1139[1] (the 'Basic Regulation') and the Rulemaking Procedure[2].

Rulemaking Tasks RMT.0712 and RMT.0128 are included in Volume II of the European Plan for Aviation Safety (EPAS) for 2022-2026[3]. The scope and timescales of the task were defined in the related Terms of Reference (ToR).

EASA developed the *draft* text of this Decision. All the interested parties were consulted through Notice of Proposed Amendment (NPA) 2021-11 'Enhancement of the safety assessment processes for rotorcraft designs' and NPA 2022-01 'Regular update of the Certification Specifications for Small Rotorcraft (CS-27), and Large Rotorcraft (CS-29)'[4]. Comments were received from interested parties, including industry and national competent authorities (NCAs).

NPA	RMT	# of comments received	# of commenters	CRD
NPA 2021-11	RMT.0712	105	19	CRD 2021-11
NPA 2022-01	RMT.0128	368	16	CRD 2022-01

EASA reviewed the comments received during the public consultation. The comments received and EASA's responses to them are presented in Comment-Response Document CRD 2021-11 and CRD 2022-01[5].

EASA developed the *final* text of this Decision with the certification specification (CSs), acceptable means of compliance (AMC), and guidance material (GM) considering the comments received during the public consultation, and published the Decision on the Official Publication[6] of EASA.

The major milestones of this RMT are presented on the cover page.

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 01-2022 of 2 May 2022 on the procedure to be applied by EASA for the issuing of opinions, certification specifications and other detailed specifications, acceptable means of compliance and guidance material ('Rulemaking Procedure'), and repealing Management Board Decision No 18-2015 (https://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-01-2022-rulemaking-procedure-repealing-mb).

3 https://www.easa.europa.eu/en/document-library/general-publications/european-plan-aviation-safety-2022-2026

4 In accordance with Article 115 of Regulation (EU) 2018/1139 and Article 6 of the Rulemaking Procedure.

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

6 https://www.easa.europa.eu/official-publication

2. In summary — why and what

2.1. Why we need to amend the CSs, AMC and GM — issue/rationale

2.1.1. RMT.0712 — Enhancement of the safety assessment processes for rotorcraft designs

The safety assessment of the design of rotorcraft systems and equipment is used to identify the presence of hazards in the design, and also to help rotorcraft designers to put in place means to eliminate the identified hazards, or mitigate the associated safety risks. Technology and techniques have evolved since the inception of formal safety assessment processes and their introduction into the CSs, and it is, therefore, necessary to maximise the probability that potential safety issues are identified during the development of a new design, in accordance with state-of-the-art safety assessment processes.

Following the publication of CS-27 Amendment 4 and CS-29 Amendment 4 in December 2016, the safety assessment provisions contained in CS 27.1309 and CS 29.1309 and the associated AMC (including the references to standards) were fully aligned with FAR 27 and FAR 29 (and FAA AC 27-1B and FAA AC 29-2C).

Since then, the Federal Aviation Administration (FAA) has published a Policy Statement entitled 'Safety Continuum for Part 27 Normal Category Rotorcraft Systems and Equipment' that provides a graduated scale of safety objectives for normal (small) rotorcraft. The FAA Policy Statement defines less stringent safety objectives than those currently contained in FAA AC 27-1B in order to facilitate the introduction of new technology. Through these less stringent safety objectives, it is expected that safety-enhancing technologies will be developed in a more affordable manner and thus become more prevalent in small rotorcraft, increasing the operational safety. In order to achieve this improvement in overall safety, new subclasses for normal category rotorcraft are defined in the Policy Statement. These subclasses are used for establishing the certification standards for systems and equipment. The FAA has defined the criteria for these subclasses based on the aircraft weight, the engine type and count, and the maximum number of occupants.

During the development of the changes to CS 27.1309 and CS 29.1309 introduced by this Decision, any potential differences in the regulatory systems between the FAA and EASA were carefully considered to avoid an increase in the validation effort required to certify rotorcraft between certification partners, and to avoid the need for any subsequent changes to the type design.

The FAA has also developed and proposed changes to Part 27.1309 and Part 29.1309, which were published as Notice of Proposed Rulemaking (NPRM) 2017-23360[7] in November 2017. The changes proposed by the FAA are intended to:

— allow more flexibility in the types of assessments that the applicant can provide to show compliance;

— remove the distinction between category A and category B rotorcraft since the technologies and associated failure effects are similar across both categories; and

[7] https://www.federalregister.gov/documents/2017/11/01/2017-23360/normal-and-transport-category-rotorcraft-certification

— reflect the fact that equipment and systems installed in some Part 27 rotorcraft are now complex and highly integrated systems.

These changes, if implemented as proposed, will create Significant Standards Differences (SSDs) between EASA and the FAA, and are likely to result in a lower level of regulatory efficiency (e.g. additional validation activities, evaluation of differences, etc.). This RMT has reviewed these changes in order to maximise the level of harmonisation.

2.1.2. RMT.0128 — Regular update of Certification Specifications for Small Rotorcraft (CS-27), and Large Rotorcraft (CS-29)

The aviation industry is complex and rapidly evolving. CSs, AMC, and GM need to be updated regularly to ensure that they are fit for purpose, cost-effective, and can be implemented in practice.

Regular updates are issued when relevant data is available following an update of industry standards, feedback from certification activities, or minor issues raised by the stakeholders.

EASA also needs to take measures as a follow-up of its response to three Safety Recommendations (NORW-2018-002, NORW-2018-003 and NORW-2018-008) received on 5 July 2018 from the Norwegian Safety Investigation Authority related to the accident to an Airbus Helicopters EC 225 LP, registration LN-OJF, Norway:

— to improve the existing provisions and procedures applicable to critical parts on helicopters in order to ensure that design assumptions are valid throughout their service life;

— to amend the Acceptable Means of Compliance (AMC) to the Certification Specifications (CSs) for Large Rotorcraft (CS-29) in order to highlight the importance of different modes of component structural degradation and how these can affect crack initiation and propagation and ultimately fatigue life; and

— to amend the corresponding CSs with regard to the instructions for continued airworthiness (ICA) for critical parts on helicopters in order to maintain their design integrity after being subject to any unusual event.

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 achieving the overall objectives by addressing the issue(s) described in Section 2.1.

The specific objectives of this Decision are, therefore, to:

— ensure that an acceptable safety level for equipment and systems as installed on the rotorcraft is achieved, defined and assessed during certification through the articulation of appropriate CSs and associated AMC; and

— reduce the regulatory differences between EASA and the FAA, and ultimately, to reduce the validation effort for industry.

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

2.3.1. RMT.0712 — Enhancement of the safety assessment processes for rotorcraft designs

Changes to CS 27.1309

CS 27.1309 generally applies to all systems on the rotorcraft that do not otherwise have specific requirements to analyse the safety aspects of a system. The changes to CS 27.1309 address advances in technology and increases in performance of small rotorcraft that were not envisioned when this rule was originally developed. This rationale is similar to the one published by the FAA in NPRM 2017-23360. The intent of these changes is to improve and modernise rules to reflect the current state of the art in safety assessment, while seeking harmonisation of the wording as far as practicable with other CSs for other product classes. In addition, alignment with the FAA in terms of meaning of the requirement has been pursued.

In the context of safety assessment, the differentiation between single-engine and multi-engine rotorcraft has been removed, as it is considered to be not appropriate any more considering the advances in rotorcraft technology. Complex and integrated systems with high criticality might be installed on small rotorcraft irrespective of the number of engines.

A requirement that a catastrophic failure condition shall not result from a single failure has been introduced. This requirement exists for other aircraft categories, such as large aeroplanes or small electrical VTOL. It is a standard design practice in industry and considerations on ‘single failures’ are also contained in FAA AC 27-1B and the FAA safety continuum policy for rotorcraft. A review has been made of rotorcraft designs recently certified by EASA. The review has found that the ‘no-single-failure’ criterion had been taken into account systematically during the development of new rotorcraft products. It should be noted that the ‘no-single-failure’ criterion contained in CS 27.1309 only applies to systems and equipment and not to structure.

The same wording for the requirements in CS-27 and CS-29 has been selected. The amended CS 27.1309 and CS 29.1309 are objective-based requirements (i.e. the CS text provides the objective to be achieved whilst the AMC provides further details on how this objective can be achieved) and equivalent wording can be found in CSs of other product classes such as in CS 25.1309 and CS 23.2510.

A requirement has been introduced to ensure that information on unsafe operational conditions is provided to the flight crew in a timely manner, to allow them to take corrective actions. This requirement is aligned with the applicable CSs for other aircraft categories and is considered necessary in order to comply with CS 27.1309(b).

Changes to CS-27 Appendix C (reference to CS 29.1309)

The reference in CS-27 Appendix C to CS 29.1309(b)(2)(i) and (d) for rotorcraft to be certified as Category A has been removed, as the provisions for safety assessment in CS 27.1309 and CS 29.1309 have been aligned. The intent of CS 29.1309(b)(2)(i), which required that a failure condition which would prevent the continued safe flight and landing of the rotorcraft had to have a probability of extremely improbable, is already covered by the newly introduced CS 27.1309(b)(1). In addition, small CS-27 rotorcraft Category A are considered as Class IV in the newly created classes and would have similar safety objectives to those of CS-29 rotorcraft. The partial reference to some elements of CS 29.1309 has been considered to be misleading. A note has been added to clarify that the AMC to CS 29.1309 should be used for Class IV CS-27 rotorcraft to clarify this requirement.

Introduction of the new AMC1 27.1309

The AMC to CS-27 consists generally of FAA AC 27-1B (as referenced in Book 2 of CS-27). In order to introduce proportionality in the safety objectives, a dedicated AMC (AMC 27.1309) has been developed in Book 2 of CS-27. It should be used in conjunction with FAA AC 27-1B, but should take precedence over it, where stipulated, in the demonstration of compliance.

AMC1 27.1309 introduces four classes of CS-27 rotorcraft in order to introduce proportionality in the safety objectives. These classes are based on the occupant capacity of the rotorcraft and the operational capabilities, which provides a bridge to the type of operation that these rotorcraft perform. Additionally, a weight limit was introduced for Class I and II rotorcraft, in order to account for the higher risk to people on ground (third parties) considering the potential impact area from heavier rotorcraft. The definition of classes differs from the definitions contained in the FAA safety continuum. This is in part due to the different operational context in the USA and Europe. In addition, the classes presented in this AMC have been developed with the objective of being technology-agnostic (i.e. not taking the engine technology into account) and considering the type of operation for which the rotorcraft will be used. This has been achieved by using the operational capabilities (Category A or B) as a criterion for the definition of classes.

Class I rotorcraft, for which the lowest safety objectives are set, are limited to VFR operations only (day/night), in order to offer an entry level for these types of product and be consistent with the objectives in CS-23 Assessment Level I of products with similar risk levels. In addition, Class I rotorcraft would also be eligible to use Part 21 Light . The upper limit of Class IV is set for rotorcraft certified as Category A with the highest safety objectives. Class II and III rotorcraft are certified as Category B with the boundary of the occupant limit of 5 or the weight limit of 1 814 kg. This aligns with the FAA safety continuum policy.

A table has been introduced, which presents the safety objectives in terms of quantitative probabilities and required functional development assurance levels (FDALs), depending on the identified failure condition. These safety objectives have been based on the following considerations:

— Alignment with other aircraft classes (i.e. the upper limit aligns with CS-29 and Special Condition (SC) VTOL for enhanced category; the lower limit aligns with CS-23 Class I);

— Alignment with the FAA safety continuum policy for rotorcraft.

A note has been added allowing the use of architectural considerations for assigning FDALs as described in ED-79A/ARP4754A; with the only exception that no FDAL D should contribute to hazardous or catastrophic failure conditions. This limitation particularly concerns Class I to III and is based on the rationale that considers FDAL D not to be appropriate to address development errors for hazardous or catastrophic failure conditions.

A note has been added to AMC1 27.1309 to clarify that AMC1 29.1309 should be used for Class IV CS-27 rotorcraft, to cover the intent of the deleted reference to CS 29.1309(b)(2)(i) and (d) in CS-27 Appendix C.

Changes to CS 29.1309 and the introduction of CS 29.1310

Similar to the rationale for the change of CS 27.1309, the intent of these changes is to improve and modernise the rules to reflect the current state of the art in safety assessment, whilst also harmonising the wording as much as practicable with other CSs (and SCs) for other product classes.

The same wording for the requirements in CS-27 and CS-29 has been selected, and the rationale for the introduction of the 'no-single-failure' criterion equally applies to large rotorcraft. Single failure considerations are already addressed in FAA AC 29-2C, and rotorcraft certified in accordance with CS-29 have already systematically addressed the 'no-single-failure' criterion.

CS 29.1309(d) has been removed, as it contained details on the means of compliance and the scope of analysis that are already part of AMC 29.1309 or industry standards such as ARP4761.

CS 29.1309(g) is applicable to Electrical System/Equipment and its content is already covered in CS 29.1301 and Electrical Systems CS 29.1351/1353/1355/1357/1359, which contain more detailed requirements covering the considerations that were raised by CS 29.1309(g) at equipment or rotorcraft level. For this reason, CS 29.1309(g) has been removed.

The requirements of CS 29.1309(e) have been introduced in the new CS 29.1310. CS 29.1309(f) has been moved to the associated AMC 29.1310 due to the fact that this subparagraph already only provided clarification and suggestions on how compliance can be achieved. These subparagraphs are concerned with the capacity of the electrical generation to supply power loads in any probable configuration. The decision to move this requirement for editorial reasons into CS 29.1310 will create consistency with CS 25.1310 and allows alignment of the text of CS 27.1309 and CS 29.1309. In addition, the wording of CS 29.1310 has been slightly changed in order to be more generic.

Introduction of AMC 29.1309

Since CS 29.1309 introduces a requirement that a catastrophic failure condition shall not result from a single failure, it is deemed necessary to provide further clarifications on single-failure criteria and common-cause considerations, similar to AMC 27.1309. In addition, AMC 29.1309 recognises ED-79A/ARP4754A as an acceptable methodology for establishing a development assurance process in order to align with the current industry practice.

2.3.2. RMT.0128 — Regular update of Certification Specifications for Small Rotorcraft (CS-27), and Large Rotorcraft (CS-29)

Amendments to CS-27

AMC1 27.251 'Vibration'

AMC 27.251 has been introduced to provide suitable material to aid the demonstration of compliance with the requirements with regard to resilience to vibration. The objective is to contribute to the reduced likelihood of a potential equipment detachment.

	Difference with NPA 2022-01
AMC1 27.251	In response to the comments received, the reference to hazardous has been removed. In addition, AMC1 27.251 has been linguistically improved.

AMC1 27.307 'Proof of structure'

AMC1 27.307 has been introduced to provide means of compliance by similarity to the static and fatigue requirements. The AMC proposes criteria for classification of structure (new, similar new, derivative/similar).

	Difference with NPA 2022-01
AMC1 27.307	In response to the comments received, AMC1 27.307 has been changed. A reference has been deleted.

AMC2 27.307 'Proof of structure'

AMC2 27.307 has been introduced to provide means of compliance with the requirements on proof of structure, in particular regarding fairing substantiation.

	Difference with NPA 2022-01
AMC2 27.307	In response to the comments received, AMC2 27.307 has been updated. A reference has been deleted.

AMC3 27.307 'Proof of structure'

AMC3 27.307 has been introduced to provide means to comply with the requirements on proof of structure, in particular regarding the seat adapter plates.

	Difference with NPA 2022-01
AMC3 27.307	In response to the comments received, the text has been updated to better define minor crash conditions.

CS 27.309 'Design limitations'

CS 27.309 has been amended to ensure that the entire operational density envelope is considered when showing compliance with the structural requirements.

	Difference with NPA 2022-01
CS 27.309	N/A

AMC1 27.395 'Control system'

AMC1 27.395 has been introduced to provide means of compliance with the requirements on load design reaction loads for the flight control system, in particular to consider modern rotorcraft control system designs.

	Difference with NPA 2022-01
AMC1 27.395	N/A

AMC1 27.427 'Unsymmetrical loads'

AMC1 27.427 has been introduced to provide suitable material to aid the demonstration of load distribution.

	Difference with NPA 2022-01
AMC1 27.427	N/A

CS 27.547 'Main rotor structure'

CS 27.547 has been amended to add a missing reference.

	Difference with NPA 2022-01
AMC1 27.547	N/A

CS 27.549 'Fuselage, landing gear, and rotor pylon structures'

CS 27.549 has been amended to add a missing reference.

	Difference with NPA 2022-01
CS 27.549	N/A

AMC1 27.571 'Fatigue evaluation of flight structure'

AMC1 27.571 has been introduced to provide means of compliance with CS 27.571 with regard to the fatigue tolerance evaluation of rotor drive system components subject to rolling contact fatigue.

	Difference with NPA 2022-01
AMC1 27.571	In response to the comments received, part of the text has been updated to clarify the kind of analysis that can be performed to demonstrate compliance. 'Cleanliness' has been considered and added in the AMC.

AMC1 27.607 'Fasteners'

AMC1 27.607 has been introduced to provide means of compliance of the fasteners with certification standards, in particular those fasteners used in critical installations.

	Difference with NPA 2022-01
AMC1 27.607	In response to the comments received, AMC1 27.607 has been updated by introducing additional references.

AMC1 27.610 'Lightning and static electricity protection'

AMC1 27.610 has been introduced to provide an acceptable means of compliance for rotorcraft components evaluation after lightning strike.

	Difference with NPA 2022-01
AMC1 27.610	In response to the comments received, AMC1 27.620 has been updated by adding the term 'functional' to the evaluation of the damage consequences.

AMC1 27.613 'Material strength properties and design values'

AMC1 27.613 has been introduced to provide means to comply with the requirements on material strength properties and design values.

	Difference with NPA 2022-01
AMC1 27.613	In response to the comments received, part of AMC1 27.613 has been reworded, and the typos have been corrected.

AMC1 27.787 'Protection of occupants'

AMC1 27.787 has been introduced to provide means to comply with the requirements on protection of occupants in emergency conditions.

	Difference with NPA 2022-01
AMC1 27.787	N/A

AMC1 27.801(e) and 27.802(c) 'Model test method for flotation stability'

AMC1 27.801(e) and 27.802(c) has been amended to correct a reference to an FAA AC paragraph.

	Difference with NPA 2022-01
AMC1 27.801(e) and 27.802(c)	N/A

AMC1 27.853(c) 'Single 'non-smoking' and 'fasten seatbelt' placard

AMC1 27.853(c) has been introduced to provide means to comply with the requirements on smoking possibilities and the need to fasten the seatbelt, in particular with respect to the use of a single placard.

	Difference with NPA 2022-01
AMC1 27.853(c)	N/A

AMC1 27.903(d) 'Engines'

AMC1 27.903(d) has been introduced to provide means of compliance with CS 27.903 and to recommend that whenever the engine restart capability has not been demonstrated in flight, a clear indication should be included in the RFM Emergency Procedures Section.

	Difference with NPA 2022-01
AMC1 27.903(d)	In response to the comments received, part of AMC1 27.903(d) has been updated.

AMC1 27.923 'Rotor drive system and control mechanism tests'

AMC1 27.923 has been introduced to provide means of compliance with CS 27.923 and CS 29.923 with regard to the testing of rotor drive systems including a 30-minute power rating.

	Difference with NPA 2022-01
AMC1 27.923	In response to the comments received, part of AMC1 27.923 has been reworded to clarify the EASA position.

AMC1 27.1093(b) 'Induction system icing protection'

AMC1 27.1093(b)(1)(i) has been introduced to provide means to comply with the requirements on induction system icing protection.

	Difference with NPA 2022-01
AMC1 27.1093(b)(1)(i)	In response to the comments received, part of AMC1 27.1093(b)(1)(i) has been changed to better specify the critical power, quick accelerations and decelerations.

AMC1 27.927 'Additional tests'

AMC1 27.927 has been introduced to provide means of compliance with CS 27.927 with regard to the testing of the variable rotor speed function of a rotor drive system.

	Difference with NPA 2022-01
AMC1 27.927	N/A

AMC1 27.959 'Unusable fuel supply'

AMC1 27.959 has been introduced to provide clarification on the acceptability of analyses and ground testing which could be used as means of compliance if supported by actual flight test data.

	Difference with NPA 2022-01
AMC1 27.959	In response to the comments received, AMC1 27.959 has been revised.

AMC1 27.965 'Fuel tank tests'

AMC1 27.965 has been introduced to provide means of compliance on the fuel tank tests (vibrations and slosh tests) to be performed in showing compliance with CS 27.965.

	Difference with NPA 2022-01
AMC1 27.965	N/A

AMC1 27.1045 'Cooling test procedures'

AMC1 27.1045 has been updated in order to address the cooling capabilities when using the 30-minute power rating.

	Difference with NPA 2022-01
AMC1 27.1045	N/A

AMC1 27.1301 'Function and installation'

AMC1 27.1301 has been introduced to provide means of compliance with CS 27.1301.

	Difference with NPA 2022-01
AMC1 27.1301	N/A

CS 27.1305 'Powerplant instruments'

CS 27.1305 (l)(2) has been amended to allow installation of fuel quantity and fuel low-level sensors on the same supporting structure under specific conditions without requiring an ESF (TBC) to be granted. In addition, related AMC have been introduced.

	Difference with NPA 2022-01
CS 27.1305	N/A

AMC1 27.1305 'Powerplant instruments'

AMC1 27.1305 has been introduced to provide means of compliance with CS 27.1305.

	Difference with NPA 2022-01
AMC1 27.1305(l)(2)	In response to the comments received, AMC1 27.1305(l)(2) has been modified to maintain the need for a test capability but not necessarily as a pre-flight check requirement.

AMC1 27.1309 'Development assurance process'

AMC1 27.1309 has been introduced to provide means to comply with the requirements on development assurance process in CS 27.1309.

	Difference with NPA 2022-01
AMC1 27.1309	N/A

AMC1 27.1337 'Powerplant instruments'

AMC1 27.1337(b) has been introduced to provide clarification regarding the susceptibility of the fuel quantity indication accuracy to water contamination.

	Difference with NPA 2022-01
AMC1 27.1337(b)	N/A

CS 27.1458 'Lightweight flight recorder'

CS 27.1458 has been introduced to facilitate the approval of lightweight flight recorder installations on board light rotorcraft, when a lightweight flight recorder may be required to be installed to meet the Air OPS rules.

	Difference with NPA 2022-01

CS 27.1458	N/A

CS 27.1505 'Never-exceed speed'

The background behind the current requirement is that V_{NE} Power-OFF should be something easy to calculate for the crew starting from the V_{NE} Power-ON (either a constant V_{NE} Power-OFF was required or a constant difference from the V_{NE} Power-ON or a combination of the two approaches). This is to achieve the objective of reducing the crew mental effort. However, with the latest technology displays, this requirement may be unnecessary and cause an undue burden to applicants.

EASA has already faced several times the need to grant an ESF to modern designs of rotorcraft equipped with latest-generation avionics, where the V_{NE} Power-ON and Power-OFF are automatically calculated and displayed to the crew.

	Difference with NPA 2022-01
CS 27.1505	N/A

AMC1 27.1505 'Never-exceed speed'

	Difference with NPA 2022-01
AMC1 27.1505	In response to the comments received, AMC1 27.1505 has been improved.

AMC1 27.1521 'Powerplant limitations'

AMC1 27.1521 has been introduced to provide means of compliance on the time limit to be declared for the 30-minute power rating duration limit.

	Difference with NPA 2022-01
AMC1 27.1521	In response to the comments received, AMC1 27.1521 has been improved.

AMC1 27.1529 'Instructions for continued airworthiness'

AMC1 27.1529 has been introduced to provide means of compliance with CS 27.1529 regarding the instructions for continued airworthiness addressing the overhaul interval definition and in-service development for rotor drive systems. In addition, guidance has been also added that addresses abnormal events in operation, maintenance or during transportation of components.

	Difference with NPA 2022-01
AMC1 27.1529	In response to the comments received, AMC1 27.1529 has been improved.

CS 27.1549 'Powerplant instruments'

CS 27.1549 has been amended to align the requirements on airspeed and powerplant indicators with the equivalent FAA NPRM 2017-23360 proposed requirements.

	Difference with NPA 2022-01
CS 27.1549	N/A

CS 27.1555 'Control markings'

CS 27.1555 has been amended to align the requirements on usable fuel capacity marking with the equivalent FAA NPRM 2017-23360 proposed requirements.

	Difference with NPA 2022-01
CS 27.1555	N/A

Amendments to CS-29

AMC1 29.251 'Vibration'

AMC1 29.251 has been introduced to provide means of compliance with CS 29.251 with regard to resilience to vibration. The objective is to contribute to limit potential equipment detachment.

	Difference with NPA 2022-01
AMC1 29.251	In response to the comments received, reference to hazardous is removed. In addition, AMC1 29.251 has been linguistically improved.

AMC1 29.307 'Proof of structure'

AMC1 29.307 has been introduced to provide means of compliance by similarity to the static and fatigue requirements. The AMC proposes criteria for classification of structure (new, similar new, derivative/similar).

	Difference with NPA 2022-01
AMC1 29.307	In response to the comments received, AMC1 29.307 has been changed. A reference has been deleted.

AMC2 29.307 'Proof of structure'

AMC2 29.307 has been introduced to provide means of compliance with the requirements on proof of structure, in particular regarding fairing substantiation.

	Difference with NPA 2022-01
AMC2 29.307	In response to the comments received, AMC2 29.307 has been updated. A reference has been deleted.

AMC3 29.307 'Proof of structure'

AMC3 29.307 has been introduced to provide means to comply with the requirements on proof of structure, in particular regarding the seat adapter plates.

	Difference with NPA 2022-01
AMC3 29.307	In response to the comments received, the text has been updated to better define minor crash conditions.

CS 29.309 'Design limitations'

CS 29.309 has been amended to ensure that the entire operational density envelope is considered when showing compliance with the structural requirements.

	Difference with NPA 2022-01
CS 29.309	N/A

AMC1 29.337 'Limit manoeuvring load factor'

AMC1 29.337 has been amended to provide means of compliance with the requirements on the limit manoeuvring load factor.

	Difference with NPA 2022-01
AMC1 29.337	In response to the comments received, the text has been improved.

AMC1 29.395 'Control system'

AMC1 29.395 has been introduced to provide means of compliance with the requirements on load design reaction loads for the flight control system, in particular to consider modern rotorcraft control system designs.

	Difference with NPA 2022-01
AMC1 29.395	N/A

AMC1 29.427 'Unsymmetrical loads'

AMC1 29.427 is introduced to provide means of compliance with CS 29.427 as regards the demonstration of load distribution.

	Difference with NPA 2022-01
AMC1 29.427	N/A

AMC1 29.571 'Fatigue evaluation of flight structure'

AMC1 29.571 has been introduced to provide means of compliance with CS 29.571 with regard to the fatigue tolerance evaluation of rotor drive system components subject to rolling contact fatigue.

	Difference with NPA 2022-01
AMC1 29.571	In response to the comments received, part of the text has been updated to clarify the kind of analysis that can be performed to demonstrate compliance. 'Cleanliness' has been considered and added in the AMC.

AMC1 29.607 'Fasteners'

AMC1 29.607 has been introduced to provide means of compliance of the fasteners with certification standards, in particular those fasteners used in critical installations.

	Difference with NPA 2022-01
AMC1 29.607	In response to the comments received, AMC1 29.607 has been updated by adding additional references.

AMC1 29.610 'Lightning and static electricity protection'

AMC1 29.610 has been introduced to provide an acceptable means of compliance for rotorcraft components evaluation after lightning strike.

	Difference with NPA 2022-01
AMC1 29.610	In response to the comments received, AMC1 29.610 has been updated by adding the term 'functional' to the evaluation of the damage consequences.

AMC1 29.613 'Material strength properties and design values'

AMC1 29.613 has been introduced to provide means to comply with the requirements on material strength properties and design values.

	Difference with NPA 2022-01
AMC1 29.613	In response to the comments received, part of AMC1 29.613 has been reworded, and the typos have been corrected.

AMC1 29.787 'Protection of occupants'

AMC1 29.787 has been introduced to provide means to comply with the requirements on protection of occupants in emergency conditions.

	Difference with NPA 2022-01
AMC1 29.787	N/A

CS 29.801 'Ditching'

CS 29.801 has been amended to correct a reference.

	Difference with NPA 2022-01
CS 29.801	N/A

AMC1 29.801(e) and 29.802(c) 'Model test method for flotation stability'

AMC1 29.801(e) and 29.802(c) has been amended to correct a reference to an FAA AC paragraph.

	Difference with NPA 2022-01
AMC1 29.801(e) and 29.802(c)	N/A

CS 29.811 'Emergency exit marking'

CS 29.811 has been amended to introduce a reference to the universal exit symbol.

	Difference with NPA 2022-01
CS 29.811	N/A

AMC1 29.811(d) 'Emergency exit marking'

AMC1 29.811 has been introduced to provide means to comply with the requirements of CS 29.811.

	Difference with NPA 2022-01
AMC1 29.811	N/A

CS 29.777 'Cockpit controls'

CS 29.777 has been amended to correct a conversion error.

	Difference with NPA 2022-01
CS 29.777	N/A

AMC1 29.853(c) 'Single 'non-smoking' and 'fasten seatbelt' placard

AMC1 29.853(c) has been introduced to provide means to comply with the requirements on smoking possibilities and the need to fasten the seatbelt, in particular with respect to the use of a single placard.

	Difference with NPA 2022-01
AMC1 29.853(c)	N/A

AMC1 29.903(d) 'Engines'

AMC1 29.903(d) has been introduced to provide means of compliance and to recommend that whenever the engine restart capability has not been demonstrated in flight, a clear indication should be included in the RFM Emergency Procedures Section.

	Difference with NPA 2022-01
AMC1 29.903(d)	In response to the comments received, part of the AMC1 29.903(d) has been updated.

AMC1 29.903(e) 'Engines'

AMC1 29.903(e) has been introduced to provide means of compliance and to recommend that whenever the engine restart capability has been demonstrated in flight, a clear indication should be included in the RFM Emergency Procedures Section.

	Difference with NPA 2022-01
AMC1 29.903(e)	In response to the comments received, the text has been improved

AMC1 29.917 'Rotor drive system design'

AMC1 29.917 has been introduced to provide means of compliance on the use of auxiliary lubrication system.

	Difference with NPA 2022-01
AMC1 29.917	In response to the comments received, part of AMC1 29.917 has been updated.

AMC1 29.923 'Rotor drive system and control mechanism tests'

AMC1 29.923 has been introduced to provide means of compliance with CS 29.923 with regard to the testing of rotor drive systems including a 30-minute power rating .

	Difference with NPA 2022-01
AMC1 29.923	In response to the comments received, part of AMC1 27.923 has been reworded to clarify the EASA position.

AMC1 29.927 'Additional tests'

AMC1 29.927 has been introduced to provide means of compliance with CS 29.927 with regard to the need of additional tests in the case of a variable rotor speed.

	Difference with NPA 2022-01
AMC1 29.927	In response to the comments received, part of AMC1 27.927 has been reworded.

AMC1 29.959 'Unusable fuel supply'

AMC1 29.959 has been introduced to provide clarification on the acceptability of analyses and ground testing which could be used as means of compliance if supported by actual flight test data.

	Difference with NPA 2022-01
AMC1 29.959	In response to the comments received, AMC1 29.959 has been revised.

AMC1 29.965 'Fuel tank tests'

AMC1 29.965 has been introduced to provide means of compliance on the fuel tank tests (vibrations and slosh tests) to be performed in showing compliance with CS 29.965.

	Difference with NPA 2022-01
AMC1 29.965	N/A

CS 29.1049 'Hovering cooling test procedures'

CS 29.1049 has been updated in order to address the cooling capabilities when using the 30-minute power rating.

	Difference with NPA 2022-01
CS 29.1049	N/A

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

AMC1 29.1093(b)(1)(i) has been introduced to provide means to comply with the requirements on induction system icing protection.

	Difference with NPA 2022-01
AMC1 29.1093(b)(1)(i)	In response to the comments received, part of AMC1 27.1093(b)(1)(i) has been changed to better specify the critical power, quick accelerations and decelerations.

CS 29.1145 'Ignition switches'

CS 29.1145 has been amended to allow architectures with a FADEC engine to be compliant without requiring an ESF to be granted.

	Difference with NPA 2022-01
CS 29.1145	N/A

AMC1 29.1145(a) 'Ignition switches'

AMC1 29.1145 (a) has been introduced to provide means to comply with the requirements on ignition switches.

	Difference with NPA 2022-01
AMC1 29.1145(a)	In response to the comments received, the text has been improved.

AMC1 29.1301 'Function and installation'

AMC1 29.1301 has been introduced to provide means of compliance with CS 29.1301.

	Difference with NPA 2022-01
AMC1 29.1301	N/A

CS 29.1305 'Powerplant instruments'

CS 29.1305 has been amended to allow installation of fuel quantity and fuel low-level sensors on the same supporting structure under specific conditions without requiring an ESF (TBC) to be granted. In addition, related AMC have been introduced.

	Difference with NPA 2022-01
CS 29.1305	N/A

AMC1 29.1305(a)(4) 'Powerplant instruments'

AMC1 29.1305 has been introduced to provide means of compliance with CS 29.1305.

	Difference with NPA 2022-01
AMC1 29.1305(a)(4)	In response to the comments received, AMC1 29.1305(a)(4) has been improved.

AMC1 29.1309 'Equipment, systems and installations'

AMC1 29.1309 has been introduced to provide means to comply with the requirements on development assurance process in CS 29.1309.

	Difference with NPA 2022-01
AMC1 29.1309	N/A

AMC1 29.1319 'Equipment, systems and network security protection'

AMC1 29.1319 has been modified to clarify the term 'adverse effects on the safety of rotorcraft'.

	Difference with NPA 2022-01
AMC1 29.1319	N/A

AMC1 29.1337(b) 'Powerplant instruments'

AMC1 29.1337(b) has been introduced to provide clarification regarding the susceptibility of the fuel quantity indication accuracy to water contamination.

	Difference with NPA 2022-01
AMC1 29.1337	N/A

AMC1 29.1413(a) 'Safety belts: passenger warning devices'

AMC1 29.1413(a) has been introduced to clarify the means to indicate to the passenger when safety belt should be fastened.

	Difference with NPA 2022-01
AMC1 29.1413(a)	N/A

CS 29.1505 'Never-exceed speed'

The background behind the current requirement is that V_{NE} Power-OFF should be something easy to calculate for the crew starting from the V_{NE} Power-ON (either a constant V_{NE} Power-OFF was required or a constant difference from the V_{NE} Power-ON or a combination of the two approaches). This is to achieve the objective of reducing the crew mental effort. However, with the latest technology displays, this requirement may be unnecessary and cause an undue burden to applicants.

EASA has already faced several times the need to grant an ESF to modern designs of rotorcraft equipped with latest-generation avionics, where the V_{NE} Power-ON and Power-OFF are automatically calculated and displayed to the crew.

	Difference with NPA 2022-01
CS 29.1505	N/A

AMC1 29.1505 'Never-exceed speed'

AMC1 29.1505 has been introduced to take into consideration that VNE Power-ON and Power-OFF may be automatically calculated and displayed to the crew.

	Difference with NPA 2022-01
AMC1 29.1505	In response to the comments received, AMC1 29.1505 has been improved.

AMC1 29.1521 'Powerplant limitations'

AMC1 29.1521 has been introduced to provide means of compliance on the time limit to be declared for the 30-minute power rating.

	Difference with NPA 2022-01
AMC1 29.1521	In response to the comments received, AMC1 29.1521 has been improved.

AMC1 29.1529 'Instructions for Continued Airworthiness'

AMC1 29.1529 has been introduced to provide means of compliance with CS 29.1529 regarding the instructions for continued airworthiness addressing the overhaul interval definition and in-service development for rotor drive systems. In addition, guidance is also added that addresses abnormal events in operation, maintenance or during transportation of components.

	Difference with NPA 2022-01
AMC1 29.1529	In response to the comments received, AMC1 29.1529 has been improved.

CS 29.1549 'Powerplant instruments'

CS 29.1549 has been amended to align the requirements on airspeed and powerplant indicators with the equivalent FAA NPRM 2017-23360 proposed requirements.

	Difference with NPA 2022-01
CS 29.1549	N/A

CS 29.1555 'Control markings'

CS 29.1555 has been amended to align the requirements on usable fuel capacity marking with the equivalent FAA NPRM 2017-23360 proposed requirements.

	Difference with NPA 2022-01
CS 29.1555	N/A

AMC2 29.1555 'Control markings'

AMC2 29.155 has been introduced to provide means to comply with the requirements on Control markings.

	Difference with NPA 2022-01
AMC2 29.1555	In response to the comments received, AMC2 29.1555 has been improved.

2.4. What are the stakeholders' views — outcome of the consultation

2.4.1. RMT.0712 — Enhancement of the safety assessment processes for rotorcraft designs

During the consultation period, a total of 105 comments were received. 31 comments (~30 %) were received from authorities and 74 (~70 %) comments were received from industry and industry associations.

Each comment was reviewed and assessed to determine if there was a need to amend the proposed CS and AMC text. The outcome of this review was:

— 5 comments were accepted;

— 7 partially accepted comments were partially accepted;

— 27 comments were noted; and

— 66 comments were not accepted.

The nature and type of comments were varied but can be summarised as follows:

— Comments were received that provide general support for the approach taken and for introducing proportionality into CS-27;

— Requests for clarifications on the meanings of terminology that was included and also definitions. Where relevant, these were added, or if definitions already exist, then these were indicated in the reply;

— Requests were received to consider the types of operations that rotorcraft would perform when determining safety objectives. In addition, references to the applicable operational rules were requested. The reasons for not linking the safety objectives with the types of operations have been provided in the responses;

— Requests for clarifications for the intent of regulatory material when applied to Category A operations particularly for CS-27 rotorcraft. In the responses it was clarified that there are no significant changes to the requirements for Category A operations;

— Comments were received asking for the reasons why CS-27 Class I rotorcraft are limited to VFR operations only. The reasons for this restriction are provided in the responses;

— Requests were received to clarify or remove the 'no-single-failure' criterion from CS 27.1309. The justification for including this new criterion and the reasons for elevating it from AMC/AC to CS level are provided;

— Request to clarify which equipment or systems are within the scope of CS 27/29.1309 were received. The boundary and examples were provided in the responses to the comments.

2.4.2. RMT.0128 — Regular update of Certification Specifications for Small Rotorcraft (CS-27), and Large Rotorcraft (CS-29)

During the public consultation, EASA received 358 comments from 15 commenters. 90 % of the comments came from the industry and the other comments came from NCAs. Most of the topics presented in the document were equally commented even if some topics received more comments:

— CS/AMC 27.1458 'Lightweight flight recorder' with 23 comments;

— AMC1 27/29.571 'Fatigue evaluation of flight structure' with 25 comments;

— AMC1 27/29.602 'Critical parts' with 27 comments;

— AMC1 27.1529 'Instructions for continued airworthiness' with 20 comments;

— AMC1 27.607 'Fasteners' with 24 comments.

Regarding AMC1 27/29.602, several comments have been raised during the public publication and highlighted a need to clarify the applicability, to promote the proportionality and to better refine the concept of CIVP before introduction. A dedicated webinar was organised on 28 December 2021 to discuss those concerns with industry and NCAs. The feedback received was quite positive even if it was clear that the concept needs to be studied further. In consequence, it has been decided that this topic will not be incorporated in this regular update. A dedicated initiative will be launched to better refine the concept.

One third of the comments submitted were accepted or partially accepted, around 40 % were noted and around a quarter of them were not accepted. Generally, the commenters supported the proposal, and the comments received helped to improve the CSs, AMC, and GM.

The nature and type of comments were varied but can be summarised as follows:

— Comments were received that provide general support for the approach taken;

— Requests for clarifications on the meanings of terminology, identification of typos, proposition of text improvements. Where relevant these have been added or the text has been updated;

— A comment related to U-space was considered out of the scope of the regular update.

— Comments were received that highlight creation of new differences with FAA standards. Harmonisation with the FAA has been discussed in the reply.

— Several comments provided by the industry were duplicated by GAMA. A reference to the corresponding comments and replies have been provided in the reply.

2.5. What are the benefits and drawbacks of the amendments

2.5.1. RMT.0712 — Enhancement of the safety assessment processes for rotorcraft designs

The expected benefits of the amendments are summarised below:

— Greater proportionality for the safety objectives for small CS-27 rotorcraft, thereby also promoting the installation of equipment and technology that could improve safety;

— Increased harmonisation of the EASA safety assessment provisions for rotorcraft contained in CS 27.1309 and CS 29.1309 with other EASA CSs (and SCs) and with their FAA equivalents.

No drawbacks are identified for this proposal.

Please refer to Chapter **Error! Reference source not found.** of NPA 2021-11 which contains the impact assessment for the regulatory changes contained in this Decision and explains the different factors including the economic and safety benefits that are expected from this regulatory change.

2.5.2. RMT.0128 — Regular update of Certification Specifications for Small Rotorcraft (CS-27), and Large Rotorcraft (CS-29)

The proposed amendments reflect the state of the art of small and large rotorcraft certification. Overall, they would provide a moderate safety benefit, would have no social or environmental impacts, and would provide some economic benefits by streamlining the certification process.

The main benefit that is expected from the regulatory changes related to RMT.0128 is the resolution of safety concerns.

There are no drawbacks identified.

3. How we monitor and evaluate the amended CSs and AMC

3.1. RMT.0712 — Enhancement of the safety assessment processes for rotorcraft designs

EASA will evaluate the effectiveness of the changes to the CS-27 and CS-29 safety objectives by monitoring:

— the number and frequency of applications received for the certification of new rotorcraft using the new CS-27 classes;

— the number and frequency of applications for equipment and systems that will improve safety for CS-27 rotorcraft in Classes I, II and III;

— at the earliest 5 years after the publication of the changes to CS-27, the number of accidents involving CS-27 rotorcraft in Classes I, II and III.

3.2. RMT.0128 — Regular update of Certification Specifications for Small Rotorcraft (CS-27), and Large Rotorcraft (CS-29)

EASA will evaluate the effectiveness of the CS-27 and CS-29 amendments as part of the standard monitoring process of occurrences that are reported to EASA in accordance with Regulation (EU) No 376/2014 (the 'Occurrence Reporting' Regulation)[8].

Additional actions might be triggered by the feedback collected during DOA audits, and certification of product and associated changes.

[8] Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation, amending Regulation (EU) No 996/2010 of the European Parliament and of the Council and repealing Directive 2003/42/EC of the European Parliament and of the Council and Commission Regulations (EC) No 1321/2007 and (EC) No 1330/2007 (OJ L 122, 24.4.2014, p. 18) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014R0376&qid=1670404317469).

4. References

4.1. Related EU regulations

N/A

4.2. Related EASA 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')

4.3. Other reference documents

N/A

5. Related documents

— CRD 2021-11 ‘Enhancement of the safety assessment processes for rotorcraft designs’

— CRD 2022-01 ‘Regular update of Certification Specifications for Small Rotorcraft (CS-27), and Large Rotorcraft (CS-29)’