



Terms of Reference

for rulemaking task RMT.0710

Improvement in the survivability of rotorcraft occupants in the event of an otherwise survivable crash

ISSUE 1

Issue/rationale

The likelihood of survival of rotorcraft occupants in the event of an otherwise survivable crash would be significantly increased through the retroactive application of the current design requirements for crash-resistant fuel systems and crash-resistant seats and structures that were introduced into the certification specifications for rotorcraft in the late 1980s and early 1990s. The safety of rotorcraft occupants of rotorcraft types that were certified before the new certification specifications for rotorcraft became applicable could be significantly improved.

Safety recommendations have been put forward by accident investigation boards on the lack of crash-resistant fuel systems and crash-resistant seats and structures for rotorcraft that were certified before the significant improvements of the rules for emergency landing conditions and fuel system crash resistance were introduced in the 1980s and 1990s.

In November 2015, a new task was assigned by the FAA to the Aviation Rulemaking Advisory Committee Rotorcraft Occupant Protection Working Group (ARAC ROPWG) to provide recommendations regarding rotorcraft occupant protection rulemaking for normal and transport category rotorcraft for older certification basis type designs. EASA participated to the ARAC ROPWG and the conclusions and recommendations have now been published¹²³.

This rulemaking task will consider the recommendations of the ARAC ROPWG and the application of the outcome of this rulemaking activity to existing rotorcraft types and existing European rotorcraft fleets.

Domain:	Design and production		
Related rules:	Commission Regulation (EU) 2015/640; CS-26		
Affected stakeholders:	Design organisation approval (DOA) and production organisation approval (POA) holders		
Driver:	Safety	Rulemaking group:	No
Impact assessment:	Yes	Rulemaking Procedure:	Standard

EASA rulemaking procedure milestones

Start Terms of Reference	Public Consultation NPA	Proposal to the Commission Opinion	Adoption by the Commission Implementing/Delegated acts	Decision Certification Specifications, Acceptable Means of Compliance, Guidance Material
16.12.2021	Subtask 1: 2022/Q4 Subtask 2: 2022/Q4	Subtask 1: 2023/Q4 Subtask 2: 2024/Q3	Subtask 1: 2024/Q4 Subtask 2: 2024/Q3	Subtask 1: 2024/Q4 Subtask 2: 2024/Q3

¹ https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3503/

² https://www.faa.gov/regulations_policies/rulemaking/committees/documents/media/ROPWG%20Task%206%20Final%20Report%20Revised%202018-09-27.pdf

³ https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3483/



1. Why we need to amend the rules — issue/rationale

Related safety issues

In the 1980s and 1990s, the certification requirements of FAA 14 CFR Part 27 and Part 29 were amended to require newly certified rotorcraft to incorporate features that would improve the survivability of occupants in the event of a crash.

These amendments included the following:

- crash-resistant fuel systems (CRFSs) that are capable of sustaining:
 - dynamic deceleration loads under drop height of (at least) 15.2 m (50 ft) under specific conditions⁴;
 - static ultimate inertial load factors⁵;
- crash-resistant seats and structures (CRSSs) that include:
 - cabin installation/protection means to ensure that items of mass within the cabin and occupants are restrained under the required ultimate inertial load factors⁶;
 - dynamic and static structural requirements for seats combined with anthropomorphic criteria⁷;
 - protection of occupants against any item of mass above and/or behind the crew and passenger compartment that could injure them.

These additional design requirements included the emergency landing conditions that need to be considered when designing the rotorcraft to ensure that the occupants are provided with a degree of protection in the event of a crash, and also the additional fuel system crash resistance requirements. The intent of these design improvements was to significantly improve occupant protection for small CS-27⁸ and large CS-29⁹ rotorcraft in the event of a survivable emergency landing impact and to minimise the hazards to occupants from any subsequent fuel fires following an otherwise survivable impact (crash landing).

The JAA, and subsequently its successor, EASA, incorporated these improved occupant protection certification requirements into CS-27 for small rotorcraft and into CS-29 for large rotorcraft, and subsequently they are now applicable to all newly certified rotorcraft.

Rotorcraft that were designed and certified before 1989 for CRSSs and before 1994 for CRFSs (and their derivatives that maintain the original certification basis) have not been required to meet these improved occupant protection requirements, and many of these rotorcraft are still in production today. This has resulted in a low incorporation rate of occupant protection features into the existing rotorcraft fleets. The number of fatal accidents where the effects of the crash (in terms of preventing fatalities and injuries) could have been mitigated through an improved design for occupant protection

⁴ As described in CS 29.952(a).

⁵ As defined in CS 29.952(b).

⁶ As described in CS 27/29.561.

⁷ As described in CS 27/29.562 and CS 27/29.785.

⁸ Certification Specifications, Acceptable Means of Compliance and Guidance Material for Small Rotorcraft.

⁹ Certification Specifications, Acceptable Means of Compliance and Guidance Material for Large Rotorcraft.



remains high. Moreover, derivative rotorcraft certified and produced after 1994 have not been required to comply with the latest certification specifications due to the use of the original pre-1994 certification basis. As a consequence, some rotorcraft certified after 1994 did not have to comply with the latest occupant protection requirements. Therefore, only a small portion of the rotorcraft that are currently in service in Europe are fully compliant with the CRFS and CRSS requirements.

In-service experience and analysis of accident data has shown that the installation of fuel bladders is essential for compliance with the CRFS requirements and can significantly improve safety in the event of a survivable crash. However, compliance with the CRSS requirements can have a significant impact on the seat installation. In addition, the CRSS requirements stipulate the need for the restraint of items within the cabin and also the load strength of the airframe structure adjacent to the cabin. The need to demonstrate compliance with the CRSS requirements can widely and significantly impact on the airframe design.

Safety recommendations:

EASA and the FAA have been informed and alerted several times on the consequences of the lack of incorporation of the latest occupant protection requirements in rotorcraft fleets. Indeed, safety recommendations have been addressed to EASA and the FAA on the need to improve the incorporation of the requirements for CRFSs and/or into newly manufactured rotorcraft and/or as a retroactive modification that can be installed to existing rotorcraft fleets.

Examples of safety recommendations addressed to EASA are listed below:

For crash-resistant fuel systems (CRFSs):

- Accident Robinson R44 VH-HWQ 21 March 2013 Australia (ASTL-2015-029) ATSB AO-2013-055-SR-029: 'The ATSB recommends that the European Aviation Safety Agency take action to increase the number of existing rotorcraft that are fitted with a crash-resistant fuel system or have an equivalent level of safety in respect of post-impact fire.'
- (ASTL-2015-030) ATSB AO-2013-055-SR-030: 'The ATSB recommends that the European Aviation Safety Agency take action to increase the number of helicopters manufactured in accordance with the 1994 certification requirements for helicopters to include a crash-resistant fuel system.'
- Accidents EC130B4 (N356AM) 06 March 2015 St. Louis, Missouri and AS350B3e (N390LG) 03 July 2015, Frisco, Colorado (UNST-2016-001) NTSB (Two survivable accidents with serious injuries because of post-crash fires resulting from impact-related breach in the fuel tank): 'Once Airbus Helicopters completes development of a retrofit kit to incorporate a crash-resistant fuel system into AS350 B3e and similarly designed variants, prioritize its approval to accelerate its availability to operators (A-16-11).'
- On 15 January 2014, the NTSB released the following recommendations: (A-14-001) 'Require owners and operators of existing R44 helicopters to comply with the fuel tank retrofit advised in Robinson Helicopter Company Service Bulletin SB-78B to improve the helicopters' resistance to a post-accident fuel tank leak (A-14-001).'
- Loss of control Robinson Helicopter Company R44 Astro, VH-HFH on 4 FEB 2011 report AO-2011-06 no specific safety recommendation was released by the ATSB (Australian Transport Safety Bureau), but the Bladder-type fuel tank retrofit was mentioned. Following the VH-HFH



accident, on 9 MAR 2012, the ATSB released safety advisory notice AO-2012-021-SAN-001 on R44 helicopter all-aluminium fuel tanks.

- Loss of control involving Robinson R44 helicopter, VH-COK on 4 February 2012 report AO-2012-021 released on 3 May 2013. The ATSB released recommendation AO-2012-021-SI-01 Fitment of rubber, bladder-type fuel tanks to R44 helicopters.
- Collision with terrain involving Robinson R44 helicopter, VH-HWQ on 21 March 2013. On 5 April 2013, the ATSB released safety recommendation AO-2013-055-SR-001 towards CASA: 'The ATSB recommends that CASA take further action to ensure that owners and operators of Robinson R44 helicopters are aware of the relevant regulatory requirements and comply with the manufacturer's service bulletin SB-78B to replace all-aluminium fuel tanks with bladder-type tanks on Robinson R44 helicopters.'
- Following an accident involving a AS350 (CS-HFT) in Portugal on 5 September 2019, the Portuguese accident investigation authority made the following recommendation to EASA (PORT-2020-001): 'It is recommended that EASA follow its Rotorcraft Safety Roadmap publication principles, producing rulemaking documentation requiring retroactive application of the current improvements in fuel tank crash resistance for rotorcraft certified before the new certification specification for type design entered into force. Helicopters used for Commercial Operations shall be subject to this additional airworthiness requirement for operations.'
- On Saturday 31 August 2019, an Airbus Helicopters AS350 B3, registered LN-OFU, crashed in the Skoddevarre mountains near Alta (Norway). The investigation of this accident is still on-going, however, the circumstances of this accident indicate that a post-crash fire would have started immediately or very soon after the impact on ground. All six persons on board were fatally injured. The investigation of this accident, and any safety recommendation that could be addressed to EASA, will therefore be taken into account in this rulemaking task.

In addition, EASA issued a report internally in 2014 titled 'Robinson R44 Post Impact fire Unsafe condition evaluation'. Based upon this report, it was concluded that a potential unsafe condition existed considering:

- the abnormal post-crash fire rate when considering rotorcraft generational evolution;
- the abnormal R44 post-crash fire rate compared to other rotorcraft;
- the potential technical susceptibility to risk of leak/ignition source of the R44 compared to the R22;
- the events causing fatalities.

Similar conclusions have been made for the AS350 (squirrel family).

For crash-resistant seats and structures (CRSSs):

- Accident to Bell 204B (OE-XBT) on 23/07/2010 at Hinterthal, Austria AUST-2011-011 (Unofficial translation): 'To FAA, EASA: To meet the increased potential risk of aerial-work type of flights (external load flights), helicopters should be fitted with impact resistant pilot seats corresponding at least to the applicable certification requirements CS 27 (FAR 27) and CS 29 (FAR 29). In relation to this the granting of Grandfather Rights (CAR 7) should



be reconsidered, and in a suitable and technically feasible extent evaluated, and improvements of the impact safety and the restraint system should be made.'

Alternative means of compliance (AltMoC), as well as ICAO and third-country references relevant to this RMT

There are no:

- exemptions that are pertinent to the scope of this RMT;
- alternative means of compliance (AltMoC) relevant to this RMT;
- direct references to ICAO Standards and Recommended Practices (SARPs); nor
- references to European Union (EU) regulatory material that is relevant to this RMT.

2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of Regulation (EU) 2018/1139 (Basic Regulation). This RMT will contribute to achieving the overall objectives by addressing the issues described in Section 1.

The overall objective of this task is to improve rotorcraft occupant protection in the event of a survivable crash scenario and enhance safety by increasing the number of rotorcraft that are fitted with crashworthy fuel systems and crash-resistant seats and structures.

Compliance with the CRFS and CRSS requirements is expected to provide this protection to rotorcraft occupants, and will contribute to safety improvement.

3. How we want to achieve it

To ensure that the objectives identified in Section 2 are achieved, the following activities will be pursued:

- EASA will take into consideration, in the European context, the conclusions and recommendations from the ARAC ROPWG reports (see Section 7.3).
- EASA will determine, in the European context, the scale of the safety issues (in terms of number of accidents and associated fatalities) relating to a lack of CRFSs and CRSSs in existing European rotorcraft fleets;
- EASA will create a European rotorcraft fleet model that will be used to consider the most effective means to achieve a safety improvement to rotorcraft fleets taking into account the variables and making key assumptions, where necessary, about the future rotorcraft fleets.
- EASA will also assess whether it is justifiable to retroactively and proportionately apply the requirements for CRFSs and CRSSs to existing small CS-27 rotorcraft, small CS-27 Category A rotorcraft, and large CS-29 rotorcraft of European fleets and/or to the future production of already type-certified rotorcraft.
- EASA will consider whether full compliance with the latest certification specifications for CRFSs and CRSSs is appropriate or whether partial compliance would be more proportionate and practicable.



- EASA will develop the draft regulatory text to capture the outcome of the deliberations on the most pragmatic means to improve safety for both existing and future European rotorcraft fleets.

To ensure an efficient process, the RMT.0710-related activities will be performed in two phases, under two different subtasks:

- **Subtask 1:** Assess the proportionate retroactive application of the certification specifications for CRFSs to existing rotorcraft fleets and/or to the future production of already type-certified rotorcraft (Populations A and B). If supported by the outcome of that assessment, a proportionate retroactive requirement will be proposed.
- **Subtask 2:** Assess the proportionate retroactive application of the certification specifications for CRSSs to existing rotorcraft fleets and/or to the future production of already type-certified rotorcraft. If supported by the outcome of that assessment, a proportionate retroactive requirement will be proposed.

4. What are the deliverables

The expected deliverables of **RMT.0710** for **Subtask 1** are as follows:

- A regulatory impact assessment (RIA) to assess the safety benefits of the retroactive implementation of the CRFS measures to the future production of already type-certified products and/or a retrofit of the existing fleet in relation to the economic, environmental, proportionality, and social impacts of such a measure.
- If the above-mentioned RIA concludes that the safety benefits of the implementation of retroactive measures for CRFSs outweigh the potential economic, environmental, proportionality, and social impacts, then the following deliverables will be issued:
 - an EASA NPA to propose amendments to Annex I (Part-26) to Regulation (EU) 2015/640 and to CS-26 (including the associated guidance material (GM), as necessary);
 - an EASA Opinion with a draft implementing act to propose to the European Commission an amendment to Annex I (Part-26), based on the outcome of the NPA public consultation; and
 - an EASA Decision to amend CS-26 (including the associated GM, as necessary), based on the outcome of the NPA public consultation.

The expected deliverables of **RMT.0710** for **Subtask 2** are as follows:

- A regulatory impact assessment (RIA) to assess the safety benefits of the retroactive implementation of the CRSS measures to the future production of already type-certified products and/or a retrofit of the existing fleet in relation to the economic, environmental, proportionality, and social impacts of such a measure.
- If the above-mentioned RIA concludes that the safety benefits of the implementation of retroactive measures for CRSSs outweigh the potential economic, environmental, proportionality, and social impacts, then the following deliverables will be issued:
 - an EASA NPA to propose amendments to Annex I (Part-26) to Regulation (EU) 2015/640 and to CS-26 (including the associated GM, as necessary);



- an EASA Opinion with a draft implementing act to propose to the European Commission an amendment to Annex I (Part-26), based on the outcome of the NPA public consultation; and
- an EASA Decision to amend CS-26 (including the associated GM, as necessary), based on the outcome of the NPA public consultation.

5. How we consult

A public consultation will take place through two NPAs for Subtask 1 and 2, in accordance with Article 7 of the Rulemaking Procedure¹⁰.

6. Dependencies

There are no interfaces nor dependencies for this RMT.

7. References

7.1. Related EU regulations

- Commission Regulation (EU) 2015/640 of 23 April 2015 on additional airworthiness specifications for a given type of operations and amending Regulation (EU) No 965/2012 (OJ L 106, 24.4.2015, p. 18)

7.2. Related EASA decisions

- Executive Director Decision 2015/013/R of 8 May 2015 adopting Certification Specifications for additional airworthiness specifications for operations ('CS-26 — Issue 1')

7.3. Other references

- Rotorcraft Occupant Protection Working Group (ROPWG) Task 5 Crash Resistant Fuel Systems (CRFS) Final analysis report to the Aviation Rulemaking Advisory Committee (ARAC) Submitted on: 15 March 2018
- Rotorcraft Occupant Protection Working Group (ROPWG) Task 6 Final analysis report to the Aviation Rulemaking Advisory Committee (ARAC) Revised on: 27 September 2018
- Rotorcraft Occupant Protection Working Group (ROPWG) Task 5 Crash Resistant Seats and Structure (CRSS) Final analysis report to the Aviation Rulemaking Advisory Committee (ARAC) Submitted on: 29 January 2018

¹⁰ EASA Management Board Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications, acceptable means of compliance and guidance material ('Rulemaking Procedure') (<https://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure>).