



European Union Aviation Safety Agency
Comment-Response Document (CRD) 2022-10

RELATED NPA: 2022-10 — RMT.0710
21.6.2024

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1. Summary of the outcome of the consultation

117 comments were received from 31 stakeholders. Table 1 below shows the number of comments received per commentator.

COMMENTATORS	# OF COMMENTS
Air-GlaciERS SA	1
AIRBUS HELICOPTERS	1
Andri Senn	1
Arctic Air AB	1
Austro Control	1
Bell	1
British Helicopter Association	5
CAA-Norway TFH	3
Civil Aviation Authority the Netherlands	1
DB	1
DGAC FR (Mireille Chabroux)	1
European Helicopter Association	4
FAA	10
FHS	1
FOCA (Switzerland)	1
General Aviation Manufacturer Association (GAMA)	34
Heli-Lausanne SA	4
Heli-Line Hubschraubertransporte GmbH	1
HTA	2
JDB	1
KMN	1
Kusi	1
LBA	21
Leonardo Helicopters	1
Robinson Helicopter Company	1
Safran	9
SHA (AS)	1
SHeV	4
Swedish Aviation Industry Group (SAIG)	1
Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)	1
The Danish Civil Aviation and Railway Authority	1
<i>Total 117</i>	

Table 1



Table 2 below shows the number of comments per main topic.

NPA 2022-01 SEGMENTS	# OF COMMENTS
(General Comments)	20
1. About this NPA	2
2.1. Why we need to amend the rules – issue/rationale	3
2. In summary – why and what	2
2.3 How we want to achieve it – overview of the proposed amendments	5
2.2 What we want to achieve – objectives	1
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26.440 Fuel system crash resistance	2
3.1 Draft regulation (draft EASA opinion)	6
3.2 Draft certification specifications (draft EASA decision)	5
3.3 Draft guidance material (draft EASA decision)	1
GM 26.440(b)(3) Fuel line slack or stretch	1
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4. Impact assessment (IA)	2
4.1.1 Safety risk assessment	7
4.1.3 How could the issue evolve	4
4.1.2 Who is affected	2
4.3 How we want to achieve it – options	2
4.4.1 Methodology applied	4
4.5.1 Option 0 – no policy change	2
4.5 What are the impacts	3
4.5.2 Option 1 – Minimal changes to introduce retroactive CRFS requirements for newly manufactured rotorcraft	5
4.5.3. Option 2 - Option 1 plus: as of 2030, retroactive CRFS requirements for existing EU-registered rotorcraft that were type-certified in or after 1978	1
4.5.5. Option 4 - As of 2030, retroactive application of CFRS requirements to the existing fleet of rotorcraft with five or more seats	2
4.5.6. Option 5 - As of 2038, retroactive application of CFRS requirements to the whole existing EU rotorcraft fleet	2
4.6.1. Comparison of the options	3
4.6 Conclusion	7

7.5. The impact assessment (IA), as well as its qualitative and quantitative data, is of high quality	1
7.6. The regulatory proposal applies the 'better regulation' principles	1
7.4. The regulatory proposal is fit for purpose (capable of achieving the objectives set)	1
7.3. The regulatory proposal is well substantiated	1
7. Quality of the NPA	1

Total 117

Table 2

75 % of the comments were submitted by the industry (manufacturers or operators) and the other comments were submitted by the NCAs. Most of the topics were equally commented even if some topics (see below list) received more comments:

- Time frame to implement the requirements and time needed to develop kits
- Impact on old rotorcraft in service but not in production anymore
- Possible list of exemptions
- Economic impact of the new requirements

13 % of the comments submitted were accepted or partially accepted, around 59 % were noted and 28 % were not accepted as shown in Table 3 below. 5 out of the 117 comments were on Chapter 7, so not relevant with the regulatory proposal itself.

	ACCEPTED	PARTIALLY ACCEPTED	NOTED	NOT ACCEPTED	Total
# of occurrences	11	3	69	34	117
percentage	10 %	3 %	59 %	28 %	100 %

Table 3

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



2. Individual comments and responses

In responding to the comments, the following terminology is applied to attest EASA's position:

- (a) **Accepted** — EASA agrees with the comment and any proposed change is incorporated into the text.
- (b) **Partially accepted** — EASA either partially agrees with the comment or agrees with it but the proposed change is partially incorporated into the text.
- (c) **Noted** — EASA acknowledges the comment, but no change to the text is considered necessary.
- (d) **Not accepted** — EASA does not agree with the comment or proposed change.



IV. CRD table of comments, responses and resulting text

(General Comments)

-

comment	3	comment by: <i>DGAC FR (Mireille Chabroux)</i>
	<p>DGAC-FR thanks EASA for the NPA. DGAC-FR has one comment regarding this NPA: this NPA does not explicitly state that all the amendments (included the initial version) of CS 27 and CS 29 are appropriate to demonstrate the compliance with CS 26. DGAC FR's proposal is to add "initial issue or later amendments" .</p>	
response	Noted.	
comment	4	comment by: <i>Civil Aviation Authority the Netherlands</i>
	No comments from the Netherlands on NPA 2022-10	
response	<p>Noted</p> <p>Thank you for your comment.</p>	
comment	8	comment by: <i>Swedish Transport Agency, Civil Aviation Department (Transportstyrelsen, Luftfartsavdelningen)</i>
	<p>General</p> <p>Thank you for the opportunity to comment on NPA 2022-10. Please be advised that there are no comments from the Swedish Transport Agency.</p>	
response	<p>Noted</p> <p>Thank you for your comment.</p>	
comment	9	comment by: <i>Austro Control</i>
	<p>Austro Control supports Option 3 of the NPA as stated under 4.5.4 (p. 28-30) to ensure entire EU rotorcraft fleet compliance within the shortest compliance time defined (2030).</p> <p>Justification: Since FAA and JAA introduced in 1994 certification requirements for crash-resistant fuel systems (CRFSs), which were incorporated in 2003 by EASA into CS-27 and CS-27, it is a reasonable time span to set the improved requirements into force by 2030 for the entire EU rotorcraft fleet. This is in the interest of flight safety and state of the art of the appropriate certification requirements.</p>	
response	<p>Noted</p> <p>Thank you for your comments.</p> <p>EASA has proposed an action plan that is comparable to the one proposed by the Federal Aviation Administration (FAA). The plan involves two phases: the first phase will require</p>	



the application of the CS-26 safety standards for all newly produced rotorcraft. The second phase will involve a retrofit for two distinct groups: those with less than 5 passengers and those with 6 or more than 6 passengers.

comment

20

comment by: *Heli-Line Hubschraubertransporte GmbH*

Position on Crash Resistant Fuel Tanks (NPA 2022-10)

Introductory remarks

We Heli-Line Hubschraubertransporte GmbH welcomes the opportunity to comment on the 'Notice of Proposed Amendment (NPA) 2022-10, Improvement in the survivability of rotorcraft occupants in the event of a crash – Phase 1 – Crash Resistant Fuel Systems. This proposed regulation would require that operators ensure crash resistant fuel systems (CRFS) are installed in all helicopters operating in the EU. While Heli-Line Hubschraubertransporte GmbH welcomes this initiative and the potential safety benefits, in its current form it will lead to significant consequences that could have major adverse effects our company. Heli-Line Hubschraubertransporte GmbH, therefore, is opposed to the selected option in this new NPA.

Heli-Line Hubschraubertransporte GmbH does not contradict the basic premise and the usefulness of CRFS, the argument against this proposed regulation is economic and the fact that the risk would be transferred to other parts of the global aviation community.

The proposed regulation will destroy between 300 to 400 million euros in book value across the entire European helicopter industry. This is a massive external shock on the balance sheets of Heli-Line Hubschraubertransporte GmbH that cannot be mitigated. The proposed requirements for CRFS therefore must remain an option so that we can choose based on our economic viability to install such a system. The extended timeline of 15 years does not change the legal requirement that we have to mark the value of the assets effectively and fairly in our balance sheets. The drop in value would be immediate and will be accounted for as soon as the law enters into force. In the current economic environment, this is a shock that would be almost impossible to compensate. In any case, we would have to review existing programs to enhance safety in order to best allocate our resources.

Heli-Line Hubschraubertransporte GmbH requests that the proposed option selected is Option 1, detailed on Page 21 of the NPA, and reads as follows CRFS "Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured aircraft that are operated or registered in Europe". Option 1 was identified in the NPA as the most cost effective option "Option 1 is the most cost-effective option: the cost per prevented fatality is significantly lower for the production cut-in of new deliveries compared to any of the other options...". There must be no requirement to retrofit older models.

Heli-Line Hubschraubertransporte GmbH would like to point out that the economic impact analysis of this regulation is misleading and does not capture the full effect on the



balance sheet, running cost and potential value of the helicopter and companies, as a whole. We strongly urge the regulator to take a more holistic approach regarding economic impact and take all financial aspects into consideration. An incomplete economic analysis might lead to wrong decisions that could have a massively negative effect on European operators, especially small to medium-sized companies.

Heli-Line Hubschraubertransporte GmbH does not dismiss the need for improving safety. However, Heli-Line Hubschraubertransporte GmbH considers there must be a balance between increased safety and economic feasibility. In conjunction with massive administrative burden, it is increasingly hard for small operators to serve their communities and provide essential services to Europe and the people that live within its borders. This cannot be in the interest of the regulator and European Community.

As a general principle, Heli-Line Hubschraubertransporte GmbH would like to see financial support made available to operators to encourage rapid installation of available technologies where economic imperatives may otherwise prohibit adoption. Closer alignment between the European Plan for Aviation Safety, Member States' Safety Plans and funding programmes such as Horizon Europe provide an ideal opportunity to maximise the impact of the adoption of EASA derived safety initiatives, such as CRFS in smaller aircraft.

Requested texts of regulation 26.440:

26.440 Fuel system crash resistance

(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after *[1 year after the date of entry into force]* shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

~~(b) Operators of small helicopters and large helicopters that are designed for five or more occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.~~

~~(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.~~

Requested addition to text (bold font and underlined) of certification specification CS 26.440:

CS 26.440 Fuel system crash resistance

[...]

(b) Self-sealing breakaway fuel line couplings must be installed unless hazardous relative motion of fuel system components to each other or to local rotorcraft structure is demonstrated to be extremely improbable or unless other means are provided. The couplings or equivalent devices must be installed at all fuel tank-to-fuel line connections, tank-to-tank interconnects, and at other points in the fuel system where local structural deformation could lead to release of fuel.

(1) The design and construction of self-sealing breakaway fuel line couplings must incorporate the following design features:



	<p>(i) The load necessary to separate a breakaway coupling must be between 25 % and 50 % of the minimum ultimate failure load (ultimate strength) of the weakest component in the fluid-carrying line. The separation load must in no case be less than 1334 N (300 lb), regardless of the size of the fluid line. <u>A breakaway load less than 1334 N within the 25% to 50% range may be used if the installation includes features preventing a load larger than the breakaway load from being applied to the coupling inadvertently.</u></p>
response	<p>Not accepted.</p> <p>Option 1 will only apply to the type-certificate holder, and in most cases, the design of the required modification is already available. Hence, the economic impact of implementing Option 1 is expected to be limited for both the rotorcraft industry and operators.</p> <p>The economic impact of implementing Options 4 and 5 cannot be accurately estimated as it varies significantly depending on the operator's fleet. Nevertheless, EASA and the FAA have identified the prevention of post-crash fires as a crucial safety concern, and corrective measures must be taken to ensure compliance. This has been identified several times in safety recommendations and so became a priority. The proposed implementation time has been selected to alleviate a detrimental economic impact.</p> <p>These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.</p>
comment	<p>21 comment by: JDB</p> <p><u>Position on Crash Resistant Fuel Tanks (NPA 2022-10)</u></p> <p>Introductory remarks</p> <p>We Héli-Alpes SA welcomes the opportunity to comment on the 'Notice of Proposed Amendment (NPA) 2022-10, Improvement in the survivability of rotorcraft occupants in the event of a crash – Phase 1 – Crash Resistant Fuel Systems. This proposed regulation would require that operators ensure crash resistant fuel systems (CRFS) are installed in all helicopters operating in the EU. While Héli-Alpes SA welcomes this initiative and the potential safety benefits, in its current form it will lead to significant consequences that could have major adverse effects our company. Héli-Alpes SA, therefore, is opposed to the selected option in this new NPA.</p> <p>Héli-Alpes SA does not contradict the basic premise and the usefulness of CRFS, the argument against this proposed regulation is economic and the fact that the risk would be transferred to other parts of the global aviation community.</p> <p>The proposed regulation will destroy between 300 to 400 million euros in book value across the entire European helicopter industry. This is a massive external shock on the balance sheets of Héli-Alpes SA that cannot be mitigated. The proposed requirements for CRFS therefore must remain an option so that we can choose based on our economic viability to install such a system. The extended timeline of 15 years does not change the legal requirement that we have to mark the value of the assets effectively and fairly in our balance sheets. The drop in value would be immediate and will be accounted for as</p>

soon as the law enters into force. In the current economic environment, this is a shock that would be almost impossible to compensate. In any case, we would have to review existing programs to enhance safety in order to best allocate our resources.

Héli-Alpes SA requests that the proposed option selected is Option 1, detailed on Page 21 of the NPA, and reads as follows CRFS “Amend Part/CS-26 to require compliance with the minimum CFRS requirements for newly manufactured aircraft that are operated or registered in Europe”. Option 1 was identified in the NPA as the most cost effective option “Option 1 is the most cost-effective option: the cost per prevented fatality is significantly lower for the production cut-in of new deliveries compared to any of the other options...”. There must be no requirement to retrofit older models.

The rationale for this position are as follows:

1. As highlighted above, the implementation of any other option would have significant economic consequences on our balance sheet and ability to invest in safety enhancing programs. It would send a shock through our company and lead to unintended negative consequences on the viability and the financial situation. The NPA estimates the recurring cost to be in the order of between EUR 131,000 to EUR 294,000 per aircraft (greater than 2,000 aircraft affected). Clearly, this will have an impact on the financial position of Héli-Alpes SA. It’s hard to imagine how we and other companies operating three or more helicopters will be able absorb an asset loss of up to a million euros or even more. Overall, it is hard to understand how a law can come into effect where the immediate mark down will be between 300-400m Euro across the industry.
2. The average costs of an upgrade kit, even if one is available, cannot be recouped in the current environment through an increase in revenues. Based on an average cost of an upgrade kit of EUR 150,000 per aircraft. We would have to generate EUR 480,0000 more per year to earn the investment over the time given. This is simply not feasible in the current environment. The effects of Option 1 will still be applicable until the upgrade has been made, therefore doubling the impact on operators. Loss in value and significant investments without an increase in value of the asset (helicopter). One sector where many of these legacy types are utilised is in the provision of aerial firefighting, this capability will be affected massively.
3. The adoption of a retrofit requirement will lead us to sell-off into countries where there is no regulatory requirement for CRFS. Therefore, we will be exporting the problem. The risk from these legacy helicopters does not go away. It would be just transferred. It would be better to keep these aircraft within the regulatory framework of Europe where there is a high standard of maintenance and mature operating procedures where they would present less of risk due to the lower accident rate.
4. This proposed requirement will lead to different standards compared to the United States. This in turn creates an additional burden on the OEMs, whom must manage the requirements of several jurisdictions. Exemptions granted in one jurisdiction cannot be applied in another jurisdiction. This leads to a potential loss of legal certainty and investments already taken to upgrade existing fuel tank systems may have to be re-evaluated and written off. Also, it is not yet clear if the supply chain will be able to produce and install the required number of upgrade kits to their fleet within the times allocated in the NPA. Indeed, some aircraft types are never likely to see retrofit kits designed for them due to negative business cases or technical restrictions.



Héli-Alpes SA would like to point out that the economic impact analysis of this regulation is misleading and does not capture the full effect on the balance sheet, running cost and potential value of the helicopter and companies, as a whole. We strongly urge the regulator to take a more holistic approach regarding economic impact and take all financial aspects into consideration. An incomplete economic analysis might lead to wrong decisions that could have a massively negative effect on European operators, especially small to medium-sized companies.

Héli-Alpes SA also would like to point out that every euro invested in additional safety features needs to be earned first. In the current economic environment with rising interest rates, rising costs for fixed as well as variable costs items, the pressure on operators is ever increasing. When drafting regulations, the regulator also must take into consideration the market situation and the market potential for generating the required revenues that will cover these additional costs. The regulator cannot ignore these economic realities.

Héli-Alpes SA does not dismiss the need for improving safety. However, Héli-Alpes SA considers there must be a balance between increased safety and economic feasibility. In conjunction with massive administrative burden, it is increasingly hard for small operators to serve their communities and provide essential services to Europe and the people that live within its borders. This cannot be in the interest of the regulator and European Community.

As a general principle, Héli-Alpes SA would like to see financial support made available to operators to encourage rapid installation of available technologies where economic imperatives may otherwise prohibit adoption. Closer alignment between the European Plan for Aviation Safety, Member States' Safety Plans and funding programmes such as Horizon Europe provide an ideal opportunity to maximise the impact of the adoption of EASA derived safety initiatives, such as CRFS in smaller aircraft.

Requested texts of regulation 26.440:

26.440 Fuel system crash resistance

- a. (a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after *[1 year after the date of entry into force]* shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.
- ~~b. (b) Operators of small helicopters and large helicopters that are designed for five or more occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.~~
- c. ~~(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.~~

Requested addition to text (bold font and underlined) of certification specification CS 26.440:

CS 26.440 Fuel system crash resistance

[...]



(b) Self-sealing breakaway fuel line couplings must be installed unless hazardous relative motion of fuel system components to each other or to local rotorcraft structure is demonstrated to be extremely improbable or unless other means are provided. The couplings or equivalent devices must be installed at all fuel tank-to-fuel line connections, tank-to-tank interconnects, and at other points in the fuel system where local structural deformation could lead to release of fuel.

(1) The design and construction of self-sealing breakaway fuel line couplings must incorporate the following design features:

(i) The load necessary to separate a breakaway coupling must be between 25 % and 50 % of the minimum ultimate failure load (ultimate strength) of the weakest component in the fluid-carrying line. The separation load must in no case be less than 1334 N (300 lb), regardless of the size of the fluid line. **A breakaway load less than 1334 N within the 25% to 50% range may be used if the installation includes features preventing a load larger than the breakaway load from being applied to the coupling inadvertently.**

response Not accepted
See the response to comment #20.

comment 24 comment by: FOCA (Switzerland)
Thank you for the opportunity to comment. We would like to express our support at this point, we have no further comments to make.

response Noted
Thank you for the comment.

comment 25 comment by: LBA
LBA comment:
This NPA does not differentiate sufficiently between the kind of operations CAT, SPO, NCC and NCO. The current rules include already higher requirements for commercial operation to protect passengers.

response Not accepted
The operational rules lack specific requirements for the design of fuel tank installations. The objective of this NPA is to enhance protection against post-crash fires. This is achieved through the design of fuel tank installations as proposed in CS-26.



comment	<p>48 comment by: <i>Bell</i></p> <p>Bell comments are included with comments that are provided by GAMA.</p>
response	<p>Noted</p> <p>Thank you for the comment.</p>
comment	<p>61 comment by: <i>SHA (AS)</i></p> <p>In principle, we support the introduction and installation of fuel tanks that prevent fuel from leaking and thus igniting in the event of an accident. Newly delivered helicopters are already equipped with such tanks. It is therefore primarily a question of retrofitting older aircraft.</p> <p>This retrofitting with such crash-resistant fuel tanks involves considerable investments. In order for our members to be able to finance and plan this improvement in the safety of all occupants, an appropriate transition period is needed. If this is too short, it can have disproportionate economic consequences for our members and lead to operational difficulties. For example, if the retrofit has to be carried out during the high season.</p> <p>At the same time, our helicopter operators rightly invest in numerous other aspects of flight safety, e.g. in a better display of aviation obstacles in the cockpit and thus in actual accident prevention. If the companies have to put such and similar projects on hold for financial reasons because money is being spent on retrofitting fuel tanks in older parts of the fleets, the bottom line is that flight safety would not be served. The other safety measures mentioned bring greater benefits and a stronger safety gain, because cables are a major cause of accidents in the Alps. These measures must therefore be implemented as a matter of priority, otherwise flight safety will not only be served, but the safety level would even decrease.</p> <p>Against the background of the economic and operational challenges associated with retrofitting, a transition period for retrofitting with crash resistant fuel tanks that is practicable for helicopter operators must be determined.</p>
response	<p>Noted.</p> <p>While it is true that the majority of newly delivered aircraft are already compliant, retrofitting is still necessary for older aircraft. It is important to note that an ARAG report was published in 2016, followed by the issuance of a US law in 2018. EASA has proposed an implementation deadline of 2030 for aircraft carrying more than five passengers and 2038 for those carrying fewer than five passengers. These proposed transition periods are expected to provide sufficient time for compliance. Current discussions will incorporate your comments.</p> <p>These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.</p>



comment	<p>62 comment by: <i>British Helicopter Association</i></p>
	<p>The British Helicopter Association Council supports the intent of this NPA wholeheartedly as the safety benefits are obvious. However, the full economic impact and potentially subsequent decrease in helicopter availability may not be fully realised.</p> <p>The NPA recognises that circa 60% of the European helicopter fleet has a CRFS, but does not detail whether those systems fully meet the new exacting technical standard outlined; one of the most popular types the R22 has a CRFS but it does not meet the specification. Some types will never have a CRFS designed for them as it will either be technically impossible or there will be no economic business case give low fleet numbers. Many of these aircraft will not be 'retired', but sold on to areas of the world where the legislation would not be adopted - a transference of risk to countries where the risk mitigations and safety management systems are not as mature as in Europe.</p> <p>One sector where this might be particularly relevant is in SPO. A nation's aerial firefighting capability is often provided by older generation aircraft and as they tend to be of the larger types, the 2030 cut off would negate their use for this increasingly important assistance to the civil community. EASA has indicated that they do not wish to exempt specific sectors from the deadlines, but if there is no 3rd party risk as passengers are not carried during these operations (only mission specialists) there is low residual risk in terms of numbers. There is also a chance EASA member states who treat aerial firefighting as government activity, therefore sitting outside of the regulations, still employ these unmodified or non-modifiable aircraft, thereby creating an unlevel playing field across Europe.</p> <p>While Option 1 would cause minimal disruption. Option 4 is liable to cause severe economic stress to companies currently operating an aircraft of greater than 5 seats, however, if the compliance date was moved to 2038 inline with Option 5 this would allow more time for amortisation of any retrofit or fleet replacement.</p>
response	<p>Noted</p> <p>Annex I rotorcraft are not eligible. For Option 4 and Option 5, the retrofit of the existing fleet will only require partial compliance with CS 29.952.</p> <p>The challenge of achieving compliance within the set deadline of 2030/2038 is noted and will be further discussed.</p> <p>These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.</p>
comment	<p>66 comment by: <i>AIRBUS HELICOPTERS</i></p> <p>Airbus Helicopters thanks EASA for giving it the opportunity to comment on this NPA. All the Airbus Helicopters comments have been harmonized and consolidated with ASD/GAMA. Therefore, all the Airbus Helicopters comments have been submitted to EASA on behalf of ASD/GAMA.</p>
response	<p>Noted</p>



Thank you for the comment.

comment	<p>68 comment by: FAA</p> <p>Page Number: 1</p> <p>Referenced Text: All acronyms used throughout the NPA 2022-10</p> <p>Comment/Rationale or Question: This NPA used lot of acronyms. It could be easier to find the meaning of an acronym in the report.</p> <p>Proposed Resolution: Summarize all acronyms used in the NPA 2022-10 to a table.</p> <p>Comment Type: Editorial</p>
response	<p>Noted.</p> <p>The concerns regarding the of acronyms is acknowledged. We will make sure to manage them more effectively in future NPAs.</p>
comment	<p>75 comment by: <i>European Helicopter Association</i></p> <p>The European Helicopter Association (EHA) welcomes the opportunity to comment on the ‘Notice of Proposed Amendment (NPA) 2022-10, Improvement in the survivability of rotorcraft occupants in the event of a crash – Phase 1 – Crash Resistant Fuel Systems. This proposed regulation would require that operators ensure crash resistant fuel systems (CRFS) are installed in all helicopters operating in the EU. While EHA welcomes this initiative and the potential safety benefits, in its current form it will lead to significant consequences that could have major adverse effects on the European helicopter industry. EHA, therefore, is opposed to the selected option in this new NPA.</p> <p>The EHA does not contradict the basic premise and the usefulness of CRFS, the argument against this proposed regulation is economic and the fact that the risk would be transferred to other parts of the global aviation community.</p> <p>The proposed regulation will destroy between 300 to 400 million euros in book value across the entire European helicopter industry. This is a massive external shock on the balance sheets of European operators that cannot be mitigated. The proposed requirements for CRFS therefore must remain an option so that operators can choose based on their economic viability to install such a system. The extended timeline of 15 years does not change the requirement of operators to mark the value of the assets effectively and fairly in their balance sheets. The drop in value would be immediate and will be accounted for as soon as the law enters into force.</p> <p>EHA requests that the proposed option selected is Option 1, detailed on Page 21 of the NPA, and reads as follows CRFS “Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured aircraft that are operated or registered in Europe”. Option 1 was identified in the NPA as the most cost effective option “Option 1 is the most cost-effective option: the cost per prevented fatality is significantly lower for the production cut-in of new deliveries compared to any of the other options...”. There must be no requirement to retrofit older models.</p> <p>The rationale for this position are as follows:</p>

1. As highlighted above, the implementation of any other option would have significant economic consequences on the balance sheet of European operators. It would send a shock through the European helicopter industry and lead to unintended negative consequences on the viability and the financial situation of European operators. The NPA estimates the recurring cost to be in the order of between EUR 131,000 to EUR 294,000 per aircraft (greater than 2,000 aircraft affected). Clearly, this will have an impact on the financial position of small and medium operators. It's hard to imagine how a company operating three or four helicopters will be able absorb an asset loss of up to a million euros. Overall, we estimate the immediate mark down will be between 300-400m Euro across the industry.
2. The average costs of an upgrade kit, even if one is available, cannot be recouped in the current environment through an increase in revenues. Based on an average cost of an upgrade kit of EUR 150,000 per aircraft. Assuming a profit margin of 5%, it is evident that the industry will have to generate an additional revenue of EUR 3.6bn over the 15-year refit window to pay for the installations in the number of affected helicopters (greater than 2000 aircraft). That's an additional EUR240m more in revenues annually. This is simply not feasible in the current environment. The effects of Option 1 will still be applicable until the upgrade has been made, therefore doubling the impact on operators. Loss in value and significant investments without an increase in value of the asset (helicopter). One sector where many of these legacy types are utilised is in the provision of aerial firefighting, this capability will be affected massively.
3. The adoption of a retrofit requirement may lead to an attempted sell-off into countries where there is no regulatory requirement for CRFS. Therefore, Europe will be exporting the problem. The risk from these legacy helicopters does not go away. It would be just transferred and the new region, in time, may come to view this as self-serving behaviour which might have negative consequences on the image of Europe. It would be better to keep these aircraft within the regulatory framework of Europe where there is a high standard of maintenance and mature operating procedures where they would present less of risk due to the lower accident rate.
4. This proposed requirement will lead to different standards compared to the United States. This in turn creates an additional burden on the OEMs, whom must manage the requirements of several jurisdictions. Exemptions granted in one jurisdiction cannot be applied in another jurisdiction. This leads to a potential loss of legal certainty and investments already taken to upgrade existing fuel tank systems may have to be re-evaluated and written off. Also, it is not yet clear if the supply chain will be able to produce and install the required number of upgrade kits to their fleet within the times allocated in the NPA. Indeed, some aircraft types are never likely to see retrofit kits designed for them due to negative business cases or technical restrictions.

EHA would like to point out that the economic impact analysis of this regulation is misleading and does not capture the full effect on the balance sheet, running cost and potential value of the helicopter and companies, as a whole. We strongly urge the regulator to take a more holistic approach regarding economic impact and take all financial aspects into consideration. An incomplete economic analysis might lead to wrong decisions that could have a massively negative effect on European operators, especially small to medium-sized companies.

EHA would like to point out that every euro invested in additional safety features needs to be earned first. In the current economic environment with rising interest rates, rising costs for fixed as well as variable costs items, the pressure on operators is ever increasing. When drafting regulations, the regulator also must take into consideration the market



situation and the market potential for generating the required revenues that will cover these additional costs. The regulator cannot ignore these economic realities.

EHA does not dismiss the need for improving safety. However, EHA considers there must be a balance between increased safety and economic feasibility. In conjunction with massive administrative burden, it is increasingly hard for small operators to serve their communities and provide essential services to Europe and the people that live within its borders. This cannot be in the interest of the regulator and European Community.

As a general principle, EHA would like to see financial support made available to operators to encourage rapid installation of available technologies where economic imperatives may otherwise prohibit adoption. Closer alignment between the European Plan for Aviation Safety, Member States' Safety Plans and funding programmes such as Horizon Europe provide an ideal opportunity to maximise the impact of the adoption of EASA derived safety initiatives, such as CRFS in smaller aircraft.

response Not accepted
See the response to comment #20.

comment 79 comment by: *General Aviation Manufacturers Association (GAMA)*

The General Aviation Manufacturers Association (GAMA) and the Aerospace and Defense Industries Association of Europe (ASD) greatly appreciate the opportunity to provide comments on NPA 2022-10. The comments below were developed and agreed by the joint GAMA/ASD-Europe Rotorcraft (RTR) committee, comprising major civil rotorcraft OEMs from the EU, USA, and Canada.

GAMA's staff remain at the Agency's disposal at any time if there are any questions regarding any of the comments provided below.

response Noted
Thank you for the support.

comment 80 comment by: *General Aviation Manufacturers Association (GAMA)*

GAMA/ASD fully supports and recognizes the importance of the proposed EASA NPA and the safety benefit that crash resistant fuel systems bring to the entire EU fleet. GAMA/ASD, however, understands this exact proposal to be disproportionate, particularly if considered that the EU has been less impacted by CRFS-events than other jurisdictions and already 60% of the rotorcrafts operating in Europe are CRFS-compliant. GAMA/ASD proposes that collaboration between EASA and industry be strengthened to find alternative options to address this regulatory concern.

response Noted
The proposed options are based on the ARAC study, which has been augmented with European data. The primary objective of preventing post-crash fires can only be achieved through retrofitting measures. To ease the implementation of these corrective measures,



a transition phase has been proposed. We have taken note of the concerns raised, and we will continue to examine them closely.

comment	81	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	<p>GAMA/ASD propose the creation of an industry working group (incl. OEMs, suppliers, and operators) tasked with reviewing the comments provided to this NPA and finalizing the proposed regulatory amendment. Industry will support this working group by providing quantitative data specific to the EU fleet that sustains a different and appropriate regulatory proposal, particularly in relation to the NPA's scope, applicability timelines and the Cost-benefit Analysis, including its uncertainty quantification and sensitivity analysis.</p>	
response	<p>Noted</p> <p>A cost-benefit analysis has been carried out using European data, but it is not the sole driver triggering the corrective actions. Other crucial drivers include safety recommendations already released and the impact of post-crash fires on the public.</p> <p>These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.</p>	

comment	82	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	<p><u>Rationale</u></p> <p>The NPA has several editorial errors.</p> <p><u>Proposed text/action</u></p> <p>EASA to correct the following NPA editorial errors:</p> <ul style="list-style-type: none"> In relation to this sentence: "<i>Since 2011, nine safety recommendations (SRs) have been addressed to EASA</i>", but the following list is made up by eight SRs, since the fifth bullet reports that "<i>No specific safety recommendation was published [...]</i>", EASA should correct 'nine' with 'eight'. The list is composed of eight SRs as the fifth bullet reports that '<i>no specific safety recommendation was published [...]</i>' In relation to this sentence: "<i>A list of relevant SRs that are addressed to EASA can be found in Section 2.1 under 'Realted Safety Issue'</i>", correct 'realted' to 'related'. CS-27 (right) and CS-29 (left) graphs of Figure 2 in p.15 are presented in the opposite order with respect to Figure 1 (CS-27 on the left, CS-29 on the right): this might generate confusion and/or misunderstanding, reducing overall level of clarity. EASA should switch graphs of Figure 2, moving CS-27 on the left side and CS-29 on the right in order to be coherent with Figure 1. the link reported in footnote 19 in p. 22 does not work and it redirects to a "PAGE NOT FOUND" message. Better regulation "Toolbox" correct link 	



	<p>is: https://commission.europa.eu/system/files/2023-02/br_toolbox-nov_2021_en.pdf. Also, referenced pages 245-6 do not include information on estimated benefits for prevented fatalities. This can be found in pages 287-8 instead. EASA should correct the reference.</p> <ul style="list-style-type: none"> • The NPA in p.25 highlights an economic impact: "[...] <i>This means that 12 out of the 14 rotorcraft types could have no development costs.</i>", whereas the CBA results state: "<i>non-recurring costs [...] for all 14 rotorcraft types affected by this option; [...]</i>". It is not clear how many types have been considered as contributing to non-recurring costs: values in the same page 25 seems to be not coherent, is it 12 or 14? (12, or 14?). Check references and correct 12 vs. 14 types with non-recurring costs (or clarify relevant sentences). • P.25 states: "<i>The total cost of Option 1 would be EUR 46.3 million for the 2025-2050 period</i>". P. 16 states: "<i>[...] as a benefit to offset the additional costs of EUR 52.5 million.</i>" The correct value is EUR 52,5 million (sum of 1,6 million for non-recurring costs, 19,7 million for production cost and 31,2 million for operating costs), therefore it seems only an editorial error on page 25. EASA should check the cost values provided and correct "46.3 million" with "52.5 million" on page 25. Also, add/or provide further details on the method used to evaluate the costs. • P.35 "Table 6summarises the results". Editorial error: a space is missing between "6" and "summarises".
response	<ul style="list-style-type: none"> • Not accepted. The fifth bullet does not address a SR but refers to the fuel tank protection and the Safety Advisory Notice already made for the R44 (aluminium fuel tank). The post-crash fire scenario is clearly identified in the report: 'The examining pathologist identified that the fatal injuries sustained by the pilot and passenger were due to the post-impact fire.' The main purpose of the rulemaking activities is to prevent such a scenario. • Accepted. • Accepted. • Accepted. • Accepted. • Accepted. • Accepted.
comment	<p>116 comment by: <i>Leonardo Helicopters</i></p> <p>Comments to NPA from Leonardo Helicopters have been included in the consolidated Industry position described by comments from GAMA/ASD.</p>

response	Noted Thank you for the comment.
comment	117 comment by: <i>Swedish Aviation Industry Group (SAIG)</i> The Swedish Aviation Industry Group (SAIG) is a non-profit making organisation which promotes, protects and ensures that its member companies are not neglected with respect to political issues and lobbies for the continued survival and wellbeing of the Swedish air transport industry. SAIG also takes part in many varied technical and aeropolitical discussions to ensure that members' interests are protected. SAIG represents a large number of Swedish aviation companies and for this specific NPA we have the majority of Swedish helicopter companies as members of our group. The content of the NPA affects all our helicopter members. SAIG supports 100% the comments submitted by the European Helicopter Association to NPA 2022:10.
response	Noted Thank you for the comment.

1. About this NPA

p. 4

comment	15 comment by: <i>SHeV</i> From the SHeV's point of view, the approach is basically good and the further development of the existing regulations is important and correct. The situation with the Robinson 44 shows that accidents with serious injuries or fatalities have decreased for this type of helicopter since the introduction of AD. However, for other helicopter types, accidents with serious injuries or fatalities continue to occur.
response	Noted Thank you for this feedback. The aim of implementing corrective measures is to reduce the occurrence of post-crash fire events.
comment	52 comment by: <i>Safran</i> Could you clarify if this NPA is applicable to : * UK H/C * H/C certified EASA with Government use like military, Gendarmerie, Police
response	Noted This Opinion will be applicable to aircraft registered in one of the EASA Member States.



Annex I rotorcraft will be excluded.

The list of rotorcraft not affected is defined in the Basic Regulation (Article 2(3)).



2.1. Why we need to amend the rules - issue/rationale

p. 6

comment	5	comment by: CAA-Norway TFH
	Typo in final paragraph of 2.1 (AD) No. 2014-070 should read 2014-0070.	
response	Accepted	
comment	26	comment by: LBA
	<u>LBA comment; Page 6, 7 and 8:</u>	
	"Only two types are involved in the list of accidents and safety recommendations: R44 and EC130/AS350. There is no further R44 accident/safety recommendation mentioned after the R44 AD (2014-070) becomes applicable. The latest accidents were AS350 accidents (see page 18). So, it seems to be a really effective measure to issue an AD (see R44). Why has not EASA issued an AD related the fuel tank safety for the type EC130/AS350?"	
response	Noted	
	Issuing an AD on AS350 only has been considered by EASA. However, to extend the scope of applicability, issuing an NPA has been found more appropriate to address post-crash fire events on any rotorcraft registered in Europe.	
comment	27	comment by: LBA
	<u>LBA comment Page 6:</u>	
	Accident history as presented in this section obviously indicates that some types of rotorcraft are more affected than others. Taking this into account, one might consider to open the possibility of exemption for certain old types of rotorcraft with proven positive service experience. At least if these types are no longer in production. Therefore we propose a similar approach as done with structural requirements of large airplanes (see 26.60, 26.300 and 26.330 in combination with Appendix I of Part 26 – Annex I of regulation (EU) 2015/640).	
response	Noted	
	The occurrences of post-crash fire events in certain models appears to be correlated with the number of rotorcraft in service. It is challenging to accurately assess a particular model's susceptibility to post-crash fires. However, rotorcraft that have included CS 29.952 in their certification basis have exhibited effective protection.	



2. In summary - why and what

p. 6

comment

22

comment by: DB

Position on Crash Resistant Fuel Tanks (NPA 2022-10)

Introductory remarks

We **HELIBRAVO Aviação, Lda** welcomes the opportunity to comment on the 'Notice of Proposed Amendment (NPA) 2022-10, Improvement in the survivability of rotorcraft occupants in the event of a crash – Phase 1 – Crash Resistant Fuel Systems. This proposed regulation would require that operators ensure crash resistant fuel systems (CRFS) are installed in all helicopters operating in the EU. While **HELIBRAVO Aviação, Lda** welcomes this initiative and the potential safety benefits, in its current form it will lead to significant consequences that could have major adverse effects our company. **HELIBRAVO Aviação, Lda**, therefore, is opposed to the selected option in this new NPA.

HELIBRAVO Aviação, Lda does not contradict the basic premise and the usefulness of CRFS, the argument against this proposed regulation is economic and the fact that the risk would be transferred to other parts of the global aviation community.

The proposed regulation will destroy between 300 to 400 million euros in book value across the entire European helicopter industry. This is a massive external shock on the balance sheets of **HELIBRAVO Aviação, Lda** that cannot be mitigated. The proposed requirements for CRFS therefore must remain an option so that we can choose based on our economic viability to install such a system. The extended timeline of 15 years does not change the legal requirement that we have to mark the value of the assets effectively and fairly in our balance sheets. The drop in value would be immediate and will be accounted for as soon as the law enters into force. In the current economic environment, this is a shock that would be almost impossible to compensate. In any case, we would have to review existing programs to enhance safety in order to best allocate our resources.

HELIBRAVO Aviação, Lda requests that the proposed option selected is Option 1, detailed on Page 21 of the NPA, and reads as follows CRFS "Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured aircraft that are operated or registered in Europe". Option 1 was identified in the NPA as the most cost effective option "Option 1 is the most cost-effective option: the cost per prevented fatality is significantly lower for the production cut-in of new deliveries compared to any of the other options...". There must be no requirement to retrofit older models.

The rationale for this position are as follows:

1. As highlighted above, the implementation of any other option would have significant economic consequences on our balance sheet and ability to invest in safety enhancing programs. It would send a shock through our company and lead to unintended negative consequences on the viability and the financial situation. The NPA estimates the recurring cost to be in the order of between EUR 131,000 to EUR 294,000 per aircraft (greater than 2,000 aircraft affected). Clearly, this will have an impact on the financial position of **HELIBRAVO Aviação, Lda**. It's hard to imagine how we and other companies operating three or more helicopters will be able absorb an asset loss of up to a million euros or even



more. Overall, it is hard to understand how a law can come into effect where the immediate mark down will be between 300-400m Euro across the industry.

2. The average costs of an upgrade kit, even if one is available, cannot be recouped in the current environment through an increase in revenues. Based on an average cost of an upgrade kit of EUR 150,000 per aircraft. We would have to **1 050 000 EUR** more per year to earn the investment over the time given. This is simply not feasible in the current environment. The effects of Option 1 will still be applicable until the upgrade has been made, therefore doubling the impact on operators. Loss in value and significant investments without an increase in value of the asset (helicopter). One sector where many of these legacy types are utilised is in the provision of aerial firefighting, this capability will be affected massively.

3. The adoption of a retrofit requirement will lead us to sell-off into countries where there is no regulatory requirement for CRFS. Therefore, we will be exporting the problem. The risk from these legacy helicopters does not go away. It would be just transferred. It would be better to keep these aircraft within the regulatory framework of Europe where there is a high standard of maintenance and mature operating procedures where they would present less of risk due to the lower accident rate.

4. This proposed requirement will lead to different standards compared to the United States. This in turn creates an additional burden on the OEMs, whom must manage the requirements of several jurisdictions. Exemptions granted in one jurisdiction cannot be applied in another jurisdiction. This leads to a potential loss of legal certainty and investments already taken to upgrade existing fuel tank systems may have to be re-evaluated and written off. Also, it is not yet clear if the supply chain will be able to produce and install the required number of upgrade kits to their fleet within the times allocated in the NPA. Indeed, some aircraft types are never likely to see retrofit kits designed for them due to negative business cases or technical restrictions.

HELIBRAVO Aviação, Lda would like to point out that the economic impact analysis of this regulation is misleading and does not capture the full effect on the balance sheet, running cost and potential value of the helicopter and companies, as a whole. We strongly urge the regulator to take a more holistic approach regarding economic impact and take all financial aspects into consideration. An incomplete economic analysis might lead to wrong decisions that could have a massively negative effect on European operators, especially small to medium-sized companies.

HELIBRAVO Aviação, Lda also would like to point out that every euro invested in additional safety features needs to be earned first. In the current economic environment with rising interest rates, rising costs for fixed as well as variable costs items, the pressure on operators is ever increasing. When drafting regulations, the regulator also must take into consideration the market situation and the market potential for generating the required revenues that will cover these additional costs. The regulator cannot ignore these economic realities.

HELIBRAVO Aviação, Lda does not dismiss the need for improving safety. However, **HELIBRAVO Aviação, Lda** considers there must be a balance between increased safety and economic feasibility. In conjunction with massive administrative burden, it is increasingly hard for small operators to serve their communities and provide essential services to Europe and the people that live within its borders. This cannot be in the interest of the regulator and European Community.



As a general principle, **HELIBRAVO Aviação, Lda** would like to see financial support made available to operators to encourage rapid installation of available technologies where economic imperatives may otherwise prohibit adoption. Closer alignment between the European Plan for Aviation Safety, Member States' Safety Plans and funding programmes such as Horizon Europe provide an ideal opportunity to maximise the impact of the adoption of EASA derived safety initiatives, such as CRFS in smaller aircraft.

Requested texts of regulation 26.440:

26.440 Fuel system crash resistance

(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after *[1 year after the date of entry into force]* shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

~~(b) Operators of small helicopters and large helicopters that are designed for five or more occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.~~

~~(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.~~

Requested addition to text (bold font and underlined) of certification specification CS 26.440:

CS 26.440 Fuel system crash resistance

[...]

(b) Self-sealing breakaway fuel line couplings must be installed unless hazardous relative motion of fuel system components to each other or to local rotorcraft structure is demonstrated to be extremely improbable or unless other means are provided. The couplings or equivalent devices must be installed at all fuel tank-to-fuel line connections, tank-to-tank interconnects, and at other points in the fuel system where local structural deformation could lead to release of fuel.

(1) The design and construction of self-sealing breakaway fuel line couplings must incorporate the following design features:

(i) The load necessary to separate a breakaway coupling must be between 25 % and 50 % of the minimum ultimate failure load (ultimate strength) of the weakest component in the fluid-carrying line. The separation load must in no case be less than 1334 N (300 lb), regardless of the size of the fluid line. **A breakaway load less than 1334 N within the 25% to 50% range may be used if the installation includes features preventing a load larger than the breakaway load from being applied to the coupling inadvertently.**

response Not accepted

See the response to comment #20.



comment	83	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	<p><u>Rationale</u></p> <p>Only 2 Safety Recommendations of those listed in Section 2 relate to EU events (POR, NOR). The other events occurred in Australia and the US where the regulatory framework in place and the fleet distribution is different.</p> <p>Listing the events occurred outside the EU's jurisdiction is only relevant for the purposes of providing context to the U.S. ARAC ROPWG and the subsequent U.S. legislative mandate of CRFS/CRSS to newly build rotorcraft. Events not occurred in the EU cannot and should not be used by EASA as justification for its conservative regulatory proposal.</p> <p><u>Proposed text/action</u></p> <p>EASA should note that only 2 events occurred in the EU and highlight/separate EU CRFS-related events (to be evaluated as guidance for EASA investigation and options definition/evaluation) from rest of the world's events (for reference only).</p>	
response	<p>Not accepted</p> <p>Post-crash fires can occur anywhere, and therefore investigations under the RMT consider such scenarios regardless of the accident location. However, the statistical data collected on this topic has been limited to EU-registered rotorcraft.</p>	

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

p. 8

comment	6	comment by: <i>CAA-Norway TFH</i>
	<p>CAA-Norway proposes to introduce a more aggressive entry into force for:</p> <ul style="list-style-type: none"> • CS-27 helicopters operated as CAT - Commercial Air Transport and; • Certification basis post 1977 and; • Still in production <p>Our proposal is 4 - four - years after entry into force in lieu of the 7 years proposed in the NPA.</p> <p>Our rationale is that CAT passengers cannot be expected to appreciate the inherent risk of flying in a non-CRFS helicopter nor being able to identify such helicopter. The public expects increased level of safety in case of an accident. CAT operations take place using standards acceptable in 1978. Nobody would accept the safety standard of 1978 in a new vehicle used a taxi today.</p> <p>Due to the high development and certification costs for new helicopters, one expects current designs to be in production and operation for decades. Hence safety improvements in general should be introduced in Part-26 for retrospective upgrades as well as in production.</p>	



response	<p>Noted</p> <p>This position is fully supported. However, it is challenging for commercial and technical reasons to achieve shorter deadlines than those proposed (2030-2038).</p> <p>These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.</p>
comment	<p>16 comment by: <i>SHeV</i></p> <p><i>2.3. ...- from 7 years after the entry into force of the amendments to Part-26, all rotorcraft (CS-27 and CS-29 rotorcraft) that are operated in EASA Member States (MSs) and are designed for five or more occupants will be required to comply either with the full crash resistance requirements for fuel systems that are contained in CS 27/29.952, CS 27/29.963, CS 27/29.973, and CS 27.975(b) or CS 29.975 (a) or with the CS-26 requirements that have been assessed to provide an acceptable reduction in the likelihood of a post-crash fire; and....</i></p> <p>Feedback: Due to the current economic situation, seven years is unrealistic. In some cases, entire systems or modified systems have to be developed, tested, produced and installed on a large scale. Considering that currently normal parts (e.g. batteries, oil filters, structural parts) sometimes have delivery times of more than 1.5 years, it is not possible to implement the deadline. The deadline should be set for at least twelve years.</p>
response	<p>Noted</p> <p>Many rotorcraft models currently in production have already integrated fuel tank crash protection into their design. For those in service, modifications or STCs are available for some models. In cases where no such modifications are available, it is expected that the design solutions already implemented in production will support the development of fuel tank crash protection for retrofitting onto those rotorcrafts. EASA will monitor regularly the status of the fleet.</p>



comment	29	comment by: <i>LBA</i>
<p><u>LBA comment; Page 9:</u> This statement raises the obvious question whether this partial compliance approach, if equally effective as full compliance, should be made eligible also for type certification under CS 27?</p>		
response	Not accepted	
<p>The purpose of the RMT is to enhance fuel tank protection for both new and in-service aircraft. To minimise operator costs, partial compliance has been proposed, which would offer the same level of protection. However, for new CS-27/CS-29 certification, full compliance is required.</p> <p>These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.</p>		
comment	53	comment by: <i>Safran</i>
<p>For H/C certified CFRS, the post crash fire is a CAT event but no information for a non CFRS H/C In this case, the change will managed through Part 26.To have a design change compliant to Part 26 :</p> <ul style="list-style-type: none"> * how will be classified this change ? (MAJ or Minor and why ?) * Shall be Mandatory for the potential applicant for this design to have a DOA ? * Can a non EU Organisation apply directly to EASA or through it NAA to be compliant to EU Parft 26 ? 		
response	Noted	
<p>The development of modifications for fuel tank protection should be classified as Major. The developments of the modifications or the STC should be performed under the provisions of Part 21. Any alternative procedures to the DOA should be presented to EASA for review and discussion.</p> <p>Non-EU organisations can apply for an STC or a modification to be validated by EASA.</p>		
comment	54	comment by: <i>Safran</i>
<p>The ARAC report provide two approaches for :</p> <ul style="list-style-type: none"> * Newly manufactured H/C (Task 5) --> Crashworthy fuel cells, breakaway couplings & Roll over valves * Retrofitted H/C (Task 6) --> Only crashworthy fuel cells <p>From a safety point of view, the main contributor for a post crash fire is a leakage on the fuel cells Take into account the proportionality and the conclusion of ARAC, the best Approach can be to limit the retrofit to the fuel cells. And by this way, it will be harmonised between EU & US sides</p>		

response Not accepted

EASA understood that fuel cells is fuel bladder.

It not acceptable to limit the corrective actions solely to the aircraft currently in service. Newly manufactured aircraft entering in service should also incorporate designs for fuel tank crash protection.

It is not sufficient to focus solely on protecting the fuel bladder; the fuel system as a whole should be designed to prevent fuel leakage.

2.2. What we want to achieve - objectives

p. 8

comment 28 comment by: LBA

LBA comment last sentence:
The installation of CRFS is therefore one possibility to mitigate the risks linked to a post-crash fire involving a rotorcraft. I miss other possibilities to mitigate the risk.

response Noted

Other possibilities to mitigate the risk can include operational measures or specific design conceptions but it is correct to consider that the number of corrective actions is limited in the domain of post-crash fire protection. EASA is open to suggestions for improvements in this area.

2.4. What are the expected benefits and drawbacks of the proposed amendments

p. 10

comment 31 comment by: LBA

LBA comment for "drawbacks":

The list of drawbacks miss the point that after the period of 15 years all helicopter models for which no retrofit can be provided (due to economical or technical reasons) stop flying in Europe. So, we have on the one hand the historical rotorcraft as defined in Annex 1 to the basic regulation and then the "current" models. Between these two groups several models will totally disappear. We miss proportionality in the approach and it is questionable if this is in the sense of the basic regulation to eliminate completely this part of the European helicopter development history.

response Noted.

This point is valid. With a partial compliance proposed on aircraft in service, the installation of fuel tank crash protection should be facilitated. EASA will promote the development of fuel tank crash protection modifications or STCs. EASA will review the existing models susceptible to be removed from service and continues to study alternative possibilities to mitigate this risk.



comment 50

comment by: HTA

We HTA Helicópteros Lda welcome the opportunity to comment on the 'Notice of Proposed Amendment (NPA) 2022-10, Improvement in the survivability of rotorcraft occupants in the event of a crash – Phase 1 – Crash Resistant Fuel Systems. This proposed regulation would require that operators ensure crash resistant fuel systems (CRFS) are installed in all helicopters operating in the EU. While HTA Helicópteros Lda welcomes this initiative and the potential safety benefits, in its current form it will lead to significant consequences that could have major adverse effects our company. HTA Helicópteros Lda, therefore, is opposed to the selected option in this new NPA.

HTA Helicópteros Lda does not contradict the basic premise and the usefulness of CRFS, the argument against this proposed regulation is economic and the fact that the risk would be transferred to other parts of the global aviation community.

The proposed regulation will destroy between 300 to 400 million euros in book value across the entire European helicopter industry. This is a massive external shock on the balance sheets of HTA Helicópteros Lda that cannot be mitigated. The proposed requirements for CRFS therefore must remain an option so that we can choose based on our economic viability to install such a system. The extended timeline of 15 years does not change the legal requirement that we have to mark the value of the assets effectively and fairly in our balance sheets. The drop in value would be immediate and will be accounted for as soon as the law enters into force. In the current economic environment, this is a shock that would be almost impossible to compensate. In any case, we would have to review existing programs to enhance safety in order to best allocate our resources.

HTA Helicópteros Lda requests that the proposed option selected is Option 1, detailed on Page 21 of the NPA, and reads as follows CRFS "Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured aircraft that are operated or registered in Europe". Option 1 was identified in the NPA as the most cost effective option "Option 1 is the most cost-effective option: the cost per prevented fatality is significantly lower for the production cut-in of new deliveries compared to any of the other options...". There must be no requirement to retrofit older models.

The rationale for this position are as follows:

As highlighted above, the implementation of any other option would have significant economic consequences on our balance sheet and ability to invest in safety enhancing programs. It would send a shock through our company and lead to unintended negative consequences on the viability and the financial situation. The NPA estimates the recurring cost to be in the order of between EUR 131,000 to EUR 294,000 per aircraft (greater than 2,000 aircraft affected). Clearly, this will have an impact on the financial position of HTA Helicópteros Lda. It's hard to imagine how we and other companies operating three or more helicopters will be able absorb an asset loss of up to a million euros or even more. Overall, it is hard to understand how a law can come into effect where the immediate mark down will be between 300-400m Euro across the industry.

The average costs of an upgrade kit, even if one is available, cannot be recouped in the current environment through an increase in revenues. Based on an average cost of an upgrade kit of EUR 150,000 per aircraft. We would have to generate *close too 1.000.000* EUR more per year to earn the investment over the time given. This is simply not feasible in the current environment. The effects of Option 1 will still be applicable until the upgrade has been made, therefore doubling the impact on operators. Loss in



value and significant investments without an increase in value of the asset (helicopter). One sector where many of these legacy types are utilised is in the provision of aerial firefighting, this capability will be affected massively.

The adoption of a retrofit requirement will lead us to sell-off into countries where there is no regulatory requirement for CRFS. Therefore, we will be exporting the problem. The risk from these legacy helicopters does not go away. It would be just transferred. It would be better to keep these aircraft within the regulatory framework of Europe where there is a high standard of maintenance and mature operating procedures where they would present less of risk due to the lower accident rate.

This proposed requirement will lead to different standards compared to the United States. This in turn creates an additional burden on the OEMs, whom must manage the requirements of several jurisdictions. Exemptions granted in one jurisdiction cannot be applied in another jurisdiction. This leads to a potential loss of legal certainty and investments already taken to upgrade existing fuel tank systems may have to be re-evaluated and written off. Also, it is not yet clear if the supply chain will be able to produce and install the required number of upgrade kits to their fleet within the times allocated in the NPA. Indeed, some aircraft types are never likely to see retrofit kits designed for them due to negative business cases or technical restrictions.

HTA Helicópteros Lda would like to point out that the economic impact analysis of this regulation is misleading and does not capture the full effect on the balance sheet, running cost and potential value of the helicopter and companies, as a whole. We strongly urge the regulator to take a more holistic approach regarding economic impact and take all financial aspects into consideration. An incomplete economic analysis might lead to wrong decisions that could have a massively negative effect on European operators, especially small to medium-sized companies.

HTA Helicópteros Lda also would like to point out that every euro invested in additional safety features needs to be earned first. In the current economic environment with rising interest rates, rising costs for fixed as well as variable costs items, the pressure on operators is ever increasing. When drafting regulations, the regulator also must take into consideration the market situation and the market potential for generating the required revenues that will cover these additional costs. The regulator cannot ignore these economic realities.

HTA Helicópteros Lda does not dismiss the need for improving safety. However, HTA Helicópteros Lda considers there must be a balance between increased safety and economic feasibility. In conjunction with massive administrative burden, it is increasingly hard for small operators to serve their communities and provide essential services to Europe and the people that live within its borders. This cannot be in the interest of the regulator and European Community.

As a general principle, HTA Helicópteros Lda would like to see financial support made available to operators to encourage rapid installation of available technologies where economic imperatives may otherwise prohibit adoption. Closer alignment between the European Plan for Aviation Safety, Member States' Safety Plans and funding programmes such as Horizon Europe provide an ideal opportunity to maximise the impact of the adoption of EASA derived safety initiatives, such as CRFS in smaller aircraft.

response

Not accepted

See the response to comment #20.



comment	109 comment by: <i>British Helicopter Association</i>
	<p>Para 2.4 <i>"for a limited number of rotorcraft types, there could be a need for operators to replace a non-compliant rotorcraft if the OEM does not offer design changes to make the rotorcraft type compliant with the CRFS requirements."</i></p> <p>Para 4.1.2 <i>"There are 1 763 operators with only one rotorcraft, 605 of which have in their fleet a rotorcraft that is not compliant with the CRFS requirements"</i></p> <p>From these 2 statements in the NPA it can be surmised that a significant amount of operators would be affected. One of the OEMs estimates that more than 5% of the current fleet will never have a CRFS designed/certified for it. Therefore at a minimum 32 aircraft would have to be retired or sold on outside of the EASA MSs. Many of these operators are companies providing much socio-economic benefit to the local population. 7 years is not a sufficient period to amortise the cost the cost of a retrofit CRFS (should one ever become available) or plan for an aircraft replacement - given that the current asset has already lost a significant amount of its value.</p> <p>Has EASA consulted the OEMs / MROs to find out:</p> <ol style="list-style-type: none"> 1. Which types are are unlikely to have a CRFS certified for them. 2. What the capacity of the supply change is to produce the number of CRFS required. 3. What is the capability of the OEMs and MROs to fit these kits in the time available before the deadline. <p>We suspect the answer will be that it a lot more than 32 companies / aircraft that would not meet the deadlines.</p>
response	<p>Noted</p> <p>It is worth noting that modifications can also be developed by STC holders.</p> <p>It is expected that most of the 32 company aircraft will not be affected by the 2030 deadline. For aircraft certified to carry less than 5 passengers, the deadline will be 2038.</p> <p>Regarding consultation with OEMs, it may be challenging to obtain their input at this time since the development of modification kits will only commence once the regulations and deadlines have been finalised.</p>
comment	118 comment by: <i>The Danish Civil Aviation and Railway Authority</i>
	<p>On the behalf of The Danish Civil Aviation and Railway Authority, I shall hereby convey the overall support of the Agency's proposed amendment as regards the improvement in the survivability of rotorcraft occupants in the event of a crash. However, we would also like to convey the message, that the additional costs of developing and installing the necessary design changes for the retrofit as well as the operating costs for small (CS-27)</p>

	rotorcrafts can be considered burdensome for especially this category of rotorcrafts, and the rule may appear unproportional in that case. On that basis, we would like to encourage the Agency to consider any mitigating measures for this category.
response	Noted It is possible to incorporate fuel tank crash protection in CS-27 rotorcraft with limited impact on the weight. The proposed partial compliance approach, which only requires testing of the bladder, is intended to provide greater flexibility in the design solutions for fuel tank crash protection.

CS 26.440 Fuel system crash resistance

p. 11

comment	2	comment by: <i>Robinson Helicopter Company</i>
		<p>The proposed CS 26.440 (b)(1)(i) requires the separation load for a self-sealing breakaway fuel line coupling to be no less than 1334 N (300 lb) regardless of the size of the fluid line. It also specifies the separation load be between 25% and 50% of the minimum ultimate failure load of the weakest component in the fluid-carrying line. For small fuel lines where the strength of fittings is correspondingly small, these requirements lead to a very narrow range of acceptable separation loads. Robinson Helicopter Company was unable to find a suitably robust and practical design to meet both requirements. The purpose of the 1334 N (300 lb) minimum breakaway load is to provide a robust component not susceptible to inadvertent breakage during maintenance. This is a valid concern, but the specified 1334 N appears to be an arbitrary or estimated value. Geometry of design, tools, etc. can have a large effect on susceptibility to damage during maintenance. Our R22 and R44 models have low fuel flow requirements and therefore small fuel lines. The design for our breakaway valve as implemented on the R22 and R44 has a breakaway force of 1179 N (265 lb). This is more than high enough to protect against maintenance errors and results in assurance of proper breakaway during a crash. The 1334 N requirement would have placed high loads on the rest of the fuel system. This was accepted by the FAA through an Equivalent Level of Safety finding (ELOS: AT17187LA-R/P-1 for the R44 and AT17316LA-R/P-1 for the R22).</p> <p>We request a revision of the proposed CS 26.440 (b)(1)(i) to add: <i>“A breakaway load less than 1334 N within the 25% to 50% range may be used if the installation includes features preventing a load larger than the breakaway load from being applied to the coupling inadvertently”.</i></p> <p>This provides a demonstrated robust design (we have had no reports of post-crash fires or of maintenance difficulties with the design in the almost three years since it was implemented). Without this revision, the inability to use the Equivalent Level of Safety process under Part 26 that is available under Part 21, the existing Robinson design would not be compliant and a redesign necessary. Such a redesign would provide no safety benefit and potentially reduce safety by increasing the loads on fuel system fittings during an accident where the breakaway feature would be activated. Without the proposed revision, European owners of R22 and R44 helicopters equipped with the current self-sealing breakaway valve would be required to replace this valve with an inferior design.</p>
response		Not accepted



It is important to note that the unique design of light rotorcraft, which can be equipped with 'small' fuel lines, may require specific adaptations in this case. In such instances, proposals on means of compliance can be submitted to EASA for investigation.

comment

63

comment by: FAA

Page

Number:

11

Paragraph Number: 3.2, CS 26.440(a)

Referenced Text: (2) the surface that the tank will impact after it has been dropped must not be capable of absorbing the energy of the impact (i.e. the surface must not deform as a result of the impact)

Comment/Rationale or Question: The impact results depend on the momentum change at impact (speed and impact duration). The requirements "the impact surface [...] must not be capable of absorbing the energy of the impact" and "the surface must not deform as a result of the impact" may give an impression that the impact surface must be non-deforming, but could be movable by design (not as a result of the impact.)

Proposed Resolution: Revise CS26.440(a)(2) as follows: "the surface that the tank will impact after it has been dropped must be non-deforming;"
Comment Type (Conceptual, Editorial, or Format): Conceptual

response

Accepted

The text has been revised accordingly to read 'the surface that the tank will impact after it has been dropped and the platform must be non-deforming;'

comment

65

comment by: Safran

The Analysis provided in §2 show that the H/C certified to CRFS have a high level of Safety related to the Post crash fire

For these H/C, CS2X.963 (b) require to have a minimum puncture resistance of 370 Lbs and the demonstration to the drop requirement (CS2X.952 (a)) is demonstrated with a drop test performed with the surrounding structure

For Legacy H/C, the structure is not Designed to be compliant to crashworthy then the structure can puncture the fuel cell. And the resistance of the fuel cell is one of the main contributor of potentiel post crash fire

To have an equivalent safety level, it can be proposed the following :

* puncture of 370 Lbs with a drop test in a Structure

* Or puncture of 450 Lbs with a drop test with the fuel cell alone

response

Noted.

While increasing the puncture resistance of the bladder is a valid approach when testing the bladder alone, for the purposes of the considered RMT and the corresponding retrofit, a puncture value of 250 lb applicable to bladders tested with structure has been deemed satisfactory. This is supported by in-service experience.



comment	<p>72 comment by: FAA</p> <p>Page Number: 11 Paragraph Number: 3.2 Referenced Text: CS 26.440 Fuel system crash resistance paragraphs (a)(b)(c)(d)(e)(f)</p> <p>Comment/Rationale or Question: These proposed paragraphs are rewrites that repeat the subset of regulations identified by the ROPWG, and codified in 49 U.S.C. 44737(2018).</p> <p>Proposed Resolution: Simplify the proposal by referencing the subset of CS-27 and CS-29 regulations, consistent with the established language of the ROPWG recommendations and 49 U.S.C. 44737(2018). This will prevent confusion and misunderstanding of the regulation proposal. (List of regulations not posted here, for simplicity).</p> <p>Comment Type: Editorial</p>
response	<p>Noted</p> <p>It is correct that the CS text on post-crash fire survivability is duplicated from the US Rotorcraft Occupant Protection Working Group (ROPWG) and is also codified in 49 U.S.C. 44737 (2018). Following investigations carried out on the EU registered fleet, it was determined that the same conclusions on applicable requirements should be made.</p> <p>Furthermore, selecting the same standard will improve harmonisation between the EASA and FAA regulations.</p> <p>However, it is important for EASA to retain the ability to adapt or improve the CS-26 operational rules.</p>
comment	<p>73 comment by: FAA</p> <p>Page Number: 11 Paragraph Number: 3.2 Referenced Text: CS 26.440 Fuel system crash resistance paragraphs (a)(b)(c)(d)(e)(f)</p> <p>Comment/Rationale or Question: The ROPWG recommendation of retrofit on the fleet was to include only fuel bladders meeting the 50 foot drop test, and a minimum material puncture resistance of 250 pounds. (Ref: 27 Sept 2018 ROPWG report, page iii, NPA ref 6.3.) The rationale is to reduce installation cost on retrofitting fleet, while improving crashworthiness with a simpler bladder only design.</p> <p>Proposed Resolution: Shorter list of regulations for all Options on retrofit of existing rotorcraft. List includes 27/29.952(a)(1)(2)(3)(5)(6), 27/29.952(f), and 27.963(g)/29.963(b): The FAA should require, in all rotorcraft, the installation (retrofit) of crash resistant fuel bladders that meet the requirements of the 50-foot fuel cell drop test in or out of structure, and that demonstrate a minimum of 250 lb puncture resistance.</p> <p>Comment Type: Editorial</p>
response	<p>Not accepted</p>



EASA wants to keep the benefits of the surrounding structures to lower the puncture resistance values. If only the bladder is tested, puncture resistance should be at least 370 lb.

comment

78

comment by: *European Helicopter Association*

Requested addition to text (bold font and underlined) of certification specification CS 26.440:

CS 26.440 Fuel system crash resistance

[...]

(b) Self-sealing breakaway fuel line couplings must be installed unless hazardous relative motion of fuel system components to each other or to local rotorcraft structure is demonstrated to be extremely improbable or unless other means are provided. The couplings or equivalent devices must be installed at all fuel tank-to-fuel line connections, tank-to-tank interconnects, and at other points in the fuel system where local structural deformation could lead to release of fuel.

(1) The design and construction of self-sealing breakaway fuel line couplings must incorporate the following design features:

(i) The load necessary to separate a breakaway coupling must be between 25 % and 50 % of the minimum ultimate failure load (ultimate strength) of the weakest component in the fluid-carrying line. The separation load must in no case be less than 1334 N (300 lb), regardless of the size of the fluid line. **A breakaway load less than 1334 N within the 25% to 50% range may be used if the installation includes features preventing a load larger than the breakaway load from being applied to the coupling inadvertently.**

response

Noted.

For compliance with CS 26.440, means of compliance can be submitted to EASA for unique design of fuel line rotorcraft.

3. Proposed amendments

p. 11

comment

14

comment by: *Kusi*

How can an Operator of a helicopter take influence on a fuel system design?
In my opinion delete complete article 3.1.

No Operator of a helicopter can take changes on a fuel system of a helicopter, how could he ensure that the likelihood of a fire is minimised as far as possible related to such a design.

In my opinion a crash resistant fuel tank system should be mandatory for all NEW CERTIFIED helicopter and airplanes after a given time such a regulatory will be taken in force.



	<p>There should not be a forcing that already existing type certificates and airframes in service have to be upgraded. This forcing would be paired with high costs to the industry and even to individuals.</p> <p>In extreme cases, there would be the forcing for a individual person to upgrade his personal helicopter to a CRFS system, for a already certified helicopter. Such a impact in financial resources and responsibilities are not acceptable and could lead to a bigger safety issue for individuals or companys.</p> <p>Therefore i strongly suggest:</p> <ul style="list-style-type: none"> - New produced helicopters have to be in compliance with a CRFS! - a retrofit of already produced or in service airframes to a CRFS is recommended but NOT mandatory. <p>Every Operator / privat helicopter owner should have the right to decide, will i upgrade my existing airframe to a CRFS, is this revenue for me in balance or not.</p> <p>Best regards</p>
response	<p>Not accepted.</p> <p>The fuel tank crash system protection has been already implemented in the requirements since 1994. Any new certified rotorcraft should already incorporate fuel tank crash protection. Nevertheless, this is not enough to ensure protection of the complete rotorcraft fleet in service. Without a corrective action, less than 95 % of the fleet will be protected by 2050. This is found not acceptable for EASA and for the public. EASA proposes a partial compliance for those rotorcraft to alleviate the economic impact with a substantial benefit for the safety of the occupants.</p>
comment	<p>51 comment by: HTA</p> <p>Requested texts of regulation 26.440:</p> <p>26.440 Fuel system crash resistance</p> <p>(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after [1 year after the date of entry into force] shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.</p> <p>(b) Operators of small helicopters and large helicopters that are designed for five or more occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.</p> <p>(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.</p>



	<p>Requested addition to text (bold font and underlined) of certification specification CS 26.440:</p> <p>CS 26.440 Fuel system crash resistance</p> <p>[...]</p> <p>(b) Self-sealing breakaway fuel line couplings must be installed unless hazardous relative motion of fuel system components to each other or to local rotorcraft structure is demonstrated to be extremely improbable or unless other means are provided. The couplings or equivalent devices must be installed at all fuel tank-to-fuel line connections, tank-to-tank interconnects, and at other points in the fuel system where local structural deformation could lead to release of fuel.</p> <p>(1) The design and construction of self-sealing breakaway fuel line couplings must incorporate the following design features:</p> <p>(i) The load necessary to separate a breakaway coupling must be between 25 % and 50 % of the minimum ultimate failure load (ultimate strength) of the weakest component in the fluid-carrying line. The separation load must in no case be less than 1334 N (300 lb), regardless of the size of the fluid line. <u>A breakaway load less than 1334 N within the 25% to 50% range may be used if the installation includes features preventing a load larger than the breakaway load from being applied to the coupling inadvertently.</u></p>
response	<p>Not accepted</p> <p>Without a corrective action, less than 95 % of the fleet will be protected by 2050. This is found not acceptable for EASA and for the public.</p> <p>Therefore, retrofit is necessary to quickly improve the crashworthiness of the existing fleet.</p> <p>Regarding the breakaway load, the comment is noted.</p> <p>For compliance with CS 26.440, means of compliance can be submitted to EASA for unique design of fuel line rotorcraft.</p>

26.440 Fuel system crash resistance
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p. 11

comment

23

comment by: *Air-Glaciers SA***Position on Crash Resistant Fuel Tanks (NPA 2022-10)**

Introductory remarks

We, Air-Glaciers SA, welcomes the opportunity to comment on the 'Notice of Proposed Amendment (NPA) 2022-10, Improvement in the survivability of rotorcraft occupants in the event of a crash – Phase 1 – Crash Resistant Fuel Systems. This proposed regulation would require that operators ensure crash resistant fuel systems (CRFS) are installed in all helicopters operating in the EU. While Air-Glaciers SA welcomes this initiative and the potential safety benefits, in its current form it will lead to significant consequences that



could have major adverse effects our company. Air-Glaciers SA, therefore, is opposed to the selected option in this new NPA.

Air-Glaciers SA does not contradict the basic premise and the usefulness of CRFS, the argument against this proposed regulation is economic and the fact that the risk would be transferred to other parts of the global aviation community.

The proposed regulation will destroy between 300 to 400 million euros in book value across the entire European helicopter industry. This is a massive external shock on the balance sheets of Air-Glaciers SA that cannot be mitigated. The proposed requirements for CRFS therefore must remain an option so that we can choose based on our economic viability to install such a system. The extended timeline of 15 years does not change the legal requirement that we have to mark the value of the assets effectively and fairly in our balance sheets. The drop in value would be immediate and will be accounted for as soon as the law enters into force. In the current economic environment, this is a shock that would be almost impossible to compensate. In any case, we would have to review existing programs to enhance safety in order to best allocate our resources.

Air-Glaciers SA requests that the proposed option selected is Option 1, detailed on Page 21 of the NPA, and reads as follows CRFS "Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured aircraft that are operated or registered in Europe". Option 1 was identified in the NPA as the most cost effective option "Option 1 is the most cost-effective option: the cost per prevented fatality is significantly lower for the production cut-in of new deliveries compared to any of the other options...". There must be no requirement to retrofit older models.

The rationale for this position are as follows:

As highlighted above, the implementation of any other option would have significant economic consequences on our balance sheet and ability to invest in safety enhancing programs. It would send a shock through our company and lead to unintended negative consequences on the viability and the financial situation. The NPA estimates the recurring cost to be in the order of between EUR 131,000 to EUR 294,000 per aircraft (greater than 2,000 aircraft affected). Clearly, this will have an impact on the financial position of Air-Glaciers SA. It's hard to imagine how we and other companies operating three or more helicopters will be able absorb an asset loss of up to a million euros or even more. Overall, it is hard to understand how a law can come into effect where the immediate mark down will be between 300-400m Euro across the industry.

The average costs of an upgrade kit, even if one is available, cannot be recouped in the current environment through an increase in revenues. Based on an average cost of an upgrade kit of EUR 150,000 per aircraft.

We would have to generate **1'080'000 EUR** (9 helicopters in our fleet need to be upgraded) more per year to earn the investment over the time given. This is simply not feasible in the current environment. The effects of Option 1 will still be applicable until the upgrade has been made, therefore doubling the impact on operators. Loss in value and significant investments without an increase in value of the asset (helicopter). One sector where many of these legacy types are utilised is in the provision of aerial firefighting, this capability will be affected massively.

The adoption of a retrofit requirement will lead us to sell-off into countries where there is no regulatory requirement for CRFS. Therefore, we will be exporting the problem. The risk from these legacy helicopters does not go away. It would be just transferred. It would be better to keep these aircraft within the regulatory framework of Europe where there



is a high standard of maintenance and mature operating procedures where they would present less of risk due to the lower accident rate.

This proposed requirement will lead to different standards compared to the United States. This in turn creates an additional burden on the OEMs, whom must manage the requirements of several jurisdictions. Exemptions granted in one jurisdiction cannot be applied in another jurisdiction. This leads to a potential loss of legal certainty and investments already taken to upgrade existing fuel tank systems may have to be re-evaluated and written off. Also, it is not yet clear if the supply chain will be able to produce and install the required number of upgrade kits to their fleet within the times allocated in the NPA. Indeed, some aircraft types are never likely to see retrofit kits designed for them due to negative business cases or technical restrictions.

Air-Glacières SA would like to point out that the economic impact analysis of this regulation is misleading and does not capture the full effect on the balance sheet, running cost and potential value of the helicopter and companies, as a whole. We strongly urge the regulator to take a more holistic approach regarding economic impact and take all financial aspects into consideration. An incomplete economic analysis might lead to wrong decisions that could have a massively negative effect on European operators, especially small to medium-sized companies.

Air-Glacières SA also would like to point out that every euro invested in additional safety features needs to be earned first. In the current economic environment with rising interest rates, rising costs for fixed as well as variable costs items, the pressure on operators is ever increasing. When drafting regulations, the regulator also must take into consideration the market situation and the market potential for generating the required revenues that will cover these additional costs. The regulator cannot ignore these economic realities.

Air-Glacières SA does not dismiss the need for improving safety. However, Air-Glacières SA considers there must be a balance between increased safety and economic feasibility. In conjunction with massive administrative burden, it is increasingly hard for small operators to serve their communities and provide essential services to Europe and the people that live within its borders. This cannot be in the interest of the regulator and European Community.

As a general principle, Air-Glacières SA would like to see financial support made available to operators to encourage rapid installation of available technologies where economic imperatives may otherwise prohibit adoption. Closer alignment between the European Plan for Aviation Safety, Member States' Safety Plans and funding programmes such as Horizon Europe provide an ideal opportunity to maximise the impact of the adoption of EASA derived safety initiatives, such as CRFS in smaller aircraft.

Requested texts of regulation 26.440:

26.440 Fuel system crash resistance

(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after *[1 year after the date of entry into force]* shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.



	<p>(b) Operators of small helicopters and large helicopters that are designed for five or more occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.</p> <p>(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.</p> <p>Requested addition to text (bold font and underlined) of certification specification CS 26.440:</p> <p>CS 26.440 Fuel system crash resistance</p> <p>[...]</p> <p>(b) Self-sealing breakaway fuel line couplings must be installed unless hazardous relative motion of fuel system components to each other or to local rotorcraft structure is demonstrated to be extremely improbable or unless other means are provided. The couplings or equivalent devices must be installed at all fuel tank-to-fuel line connections, tank-to-tank interconnects, and at other points in the fuel system where local structural deformation could lead to release of fuel.</p> <p>(1) The design and construction of self-sealing breakaway fuel line couplings must incorporate the following design features:</p> <p>(i) The load necessary to separate a breakaway coupling must be between 25 % and 50 % of the minimum ultimate failure load (ultimate strength) of the weakest component in the fluid-carrying line. The separation load must in no case be less than 1334 N (300 lb), regardless of the size of the fluid line. <u>A breakaway load less than 1334 N within the 25% to 50% range may be used if the installation includes features preventing a load larger than the breakaway load from being applied to the coupling inadvertently.</u></p>
response	<p>Not accepted</p> <p>See the response to comment #20. Regarding the breakaway load, see the response to comment #51.</p>
comment	<p>77 comment by: <i>European Helicopter Association</i></p> <p>(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after [1 year after the date of entry into force] shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.</p> <p>(b) Operators of small helicopters and large helicopters that are designed for five or more occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.</p> <p>(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.</p>
response	<p>Not accepted</p>



Without a corrective action, less than 95 % of the fleet will be protected by 2050. This is found not acceptable for EASA and for the public.

Therefore, retrofit is necessary to quickly improve the crashworthiness of the existing fleet.

These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.

3.1. Draft regulation (draft EASA opinion)

p. 11

comment

49

comment by: FAA

Page Number: 11

Paragraph Number:3.1

Referenced Text: The title of 3.1, "Draft regulation (draft EASA opinion)"

Comment: Contents of paragraphs 3.1 is not finalized. The requirements does not seem to match with CBA options presented in Section 4.3 and Table 5.

Proposed Resolution: The draft regulations compliance time should be more finalized.

Comment Type: Editorial

response

Not accepted

Point 26.440, as presented in Section 3.1, is derived from Options 1, 4 and 5 presented in Table 5. The justifications of the option selected are presented in Section 4.6.

Moreover, the CBA is not the only criterion for the selection as reported in Section 4.6: the possible liability risk in case of future accident is also considered. This explains the pragmatic approach proposed by EASA.

comment

69

comment by: FAA

Page

Number: 11

Paragraph

Number: 3.1

Referenced Text: 26.440 Fuel system crash resistance

(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after [1 year after the date of entry into force] shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

Comment/Rationale or Question: Does EASA plan to maintain a list for tracking of CRFS compliant vs non compliant rotorcraft?

Proposed Resolution: EASA maintain/share a tracking list of helicopters that are CRFS compliant vs. CRFS non compliant.

Comment Type: Editorial



response Noted

Point 26.440(a) requires all newly produced rotorcraft to be compliant with fuel tank crash protection within 1 year after the date of entry into force. A list of non-compliant rotorcraft is not necessary as per point 26.440(a). However, this list will be necessary for rotorcraft already in service affected by points 26.440 (b) and (c).

comment 74 comment by: *KMN*

I can understand the risk reduction approach, but this cannot be the right approach. This solution would bankrupt many small operators. The approach of establishing a transitional period of 7 or 15 years will not protect companies. Helicopters have a relatively long lifespan. 7/15 years should be canceled and it should affect only new produced helicopters (at least all existing helicopters with less than 9 seats should not be affected). For many small companies it would mean the end, if it would be implemented in this way. It is unacceptable that risk aversion leads to such extreme economic effects that small companies are forced out of the market as a result. How can a company with 5 helicopters, where all are affected, come up with an additional investment of possibly over EUR 1 million. The solution can only be to apply this regulation to newly produced helicopters.

response Not accepted

Without a corrective action, less than 95 % of the fleet will be protected by 2050.

With only newly manufactured rotorcraft, the fleet will be corrected by 2045.

This is found not acceptable for EASA and for the public.

Therefore, retrofit is necessary to quickly improve the crashworthiness of the existing fleet.

These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.

comment 84 comment by: *General Aviation Manufacturers Association (GAMA)*

GAMA/ASD has concerns about the applicability of the NPA to the fleet in service due to the operational constraints of some operators and the financial impact it may have on some operators of older aircraft. If EASA was to apply the NPA to the fleet in service, it is GAMA/ASD view that it shall at least limit it to operations carrying passengers such as CAT. In any case the design retrofit solutions should be aligned with the ARAC ROPWG task 6 recommendations.

Proposed text/action

GAMA/ASD primary position is to request EASA to withdraw the CRFS retrofit mandate from this NPA as follows:



(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after [1 year after the date of entry into force] shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

~~(b) Operators of small helicopters and large helicopters that are designed for five or more occupants shall ensure that the likelihood of a post crash fire is minimised as far as practicable in the design of the fuel system.~~

~~(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post crash fire is minimised as far as practicable in the design of the fuel system.~~

In case GAMA/ASD’s primary position is not considered by EASA, GAMA/ASD propose to limit the CRFS retrofit mandate to operations such as Annex IV (Part-CAT) of Reg. 965/2012:

(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after [1 year after the date of entry into force] shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

(b) Operators of small helicopters and large helicopters **under Annex IV (Part-CAT) of Reg. 965/2012** that are designed for five or more occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

(c) Operators of small helicopters and large helicopters **under Annex IV (Part-CAT) of Reg. 965/2012** that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

In case GAMA/ASD’s primary position is not considered by EASA, it is requested that, in any case, design retrofit solutions be aligned with the ARAC ROPWG task 6 recommendations. This position is further justified in CRT comments 87 and 88.

response

Noted
 Safety recommendations were issued in 2015 and the first ARAC report was published in 2016. The retrofit is planned to be completed by 2030/2038. For helicopters designed for five or more occupants, most of them should have already been included under Annex IV, therefore the economic benefit of the options proposed will be limited. In any case, this fleet needs to be protected against the risk of post-crash fire.

Regarding the rotorcraft designed for four or less occupants, a transition period of more than 20 years is proposed. In addition, it seems difficult to introduce operational criteria for the implementation of fuel tank protection against post-crash fire.

comment

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

Rationale



Industry disagrees with the implementation timelines proposed in the NPA as they can be very challenging for OEMs/operators to meet. The capacity of the supply chain and the industrial solutions required to deliver crash resistant fuel systems to both in-service and newly built rotorcraft is put at risk if the current NPA cut-off dates are to be formalized into legislation.

Proposed text/action

If the working group proposed in CRT Comment No. 81 is established, industry will provide the group with quantitative data specific to the EU fleet that sustains a different and appropriate regulatory proposal.

If the working group is not composed, GAMA/ASD propose:

- **The deadline for 26.440 (a) be extended to at least 3 years after the rule's date of entry into force.** This will ensure industrial solutions for forward fit in the EU market can be developed in an appropriate and realistic timeline. It is recognized similar legislation was adopted in the past in the United States, however, not all EU products have been subject to export to other jurisdictions and require industrial processes to be put in place.

(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after [3 year after the date of entry into force] shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

If the working group is not composed and the retrofit option is retained, GAMA/ASD propose:

- **The deadline for 26.440 (a) be extended to at least 3 years after the rule's date of entry into force – as outlined above; and**
- **The deadline for both 26.440 (b) and (b) be 15 years after the rule's entry into force for all types of rotorcrafts, as follows:**

(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after [3 year after the date of entry into force] shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

(b) Operators of small helicopters and large helicopters ~~that are designed for five or more occupants~~ shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.



	<p>(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.</p> <p><i>Point (b) to become applicable 15 years after the entry into force of the regulation.</i></p>
response	<p>Noted</p> <ul style="list-style-type: none"> • Most of the TC holders in EU and the USA have already introduced fuel tank crash protection in their design for newly produced aircraft. • The GAMA proposal does not significantly reduce the exposure to post-crash fire before 2038. <p>EASA considers that more proactive actions need to be taken for rotorcraft designed for five or more occupants (2030). The EASA 2-step approach will retrofit first rotorcraft designed for five or more occupants.</p> <p>These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.</p>
comment	<p>86 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Rationale</u></p> <p>The cut-off dates of this NPA do not consider the special situation of older rotorcraft. The ARAC ROPWG report contemplated possible additional mitigations that might have allowed the use of older rotorcrafts, thereby avoiding forced disposal when CRFS retrofits were not practical or economically viable.</p> <p>Classic/historic cars have traditionally been allowed to circulate even if not compliant with specific modern safety features, subject to meeting certain acceptable/proportional criteria. Similarly, older rotorcraft not equipped with the latest safety features should still be able to fly if operations are limited to private operations.</p> <p><u>Proposed text/action</u></p> <p>If EASA were to not withdraw the CRFS retrofit mandate, nor limit its applicability to operations such as Part-CAT, then EASA should appropriately consider the special situation of older rotorcraft by including <u>a limit date based on the date of issuance of the first CoA of the non-compliant Part 26.440 helicopters, thereby excluding the oldest aircraft from the scope of the NPA.</u> The specific date should be discussed in the WG proposed to be established in CRT Comment No. 81.</p>
response	<p>Noted</p> <p>The rotorcraft operating under Annex I will be excluded from this approach.</p>

comment	55	comment by: <i>Safran</i>
	What is the Definition of fuel tank ? (e) seems authorize to test only the fuel bladder alone	
response	Noted The fuel tank bladder without surrounding structure can be drop-tested alone on a rigid platform.	
comment	56	comment by: <i>Safran</i>
	The self-sealing breakaway fuel line couplings are Applicable to Feed line only or also to vent lines ?	
response	Noted The self-sealing breakaway fuel line couplings should only be applicable to feed line.	
comment	87	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	<u>Rationale</u> NPA 2022-10 has referenced and considered much of the ARAC ROPWG task 5 and 6 conclusions and recommendations. However, there are some instances where this NPA has deviated from the reports' recommendations, particularly in the differentiation between in-service fleet (task 6 of ARAC ROPWG) and newly produced rotorcraft (task 5 of ARAC ROPWG) and the recommendations included therein. Task No 6 of the ARAC ROPWG did not recommend for in-service aircraft: a) the installation of fuel lines self-sealing breakaway couplings, now included under EASA's proposed CS 26.440 (b)(1)(2)(3); b) the demonstration of rigid or semi-rigid fuel tanks impact tear resistance, now included under EASA's proposed CS 26.440 (d) c) the minimum puncture force of 370 lbs. for bladder resistance if not successfully drop-tested in structure, now included under EASA's proposed CS 26.440 (e). The ARAC ROPWG task 6 recommendation was to reduce to 250 lbs. puncture resistance. d) the minimizing of spillage through fuel tank vents in the event of a roll-over, now included under EASA's proposed CS 26.440 (f) ARAC ROPWG task No 6 provided appropriate technical justifications for not recommending those occupant protection changes to be incorporated for existing rotorcraft fleet in the United States, justifications that remain valid for the European Union. The same report also indicated in page 29 of task 5 that ' <i>deviations from (the report's) recommendations could significantly impact the final cost/performance penalties required to demonstrate compliance</i> '.	

Proposed text/actions

GAMA/ASD requests EASA to consider the industry's primary position outlined in CRT Comment 84 and withdraw the NPA's CRFS retrofit mandate from the scope of this NPA or alternatively limit its scope to operations such as Part-CAT. If EASA would not accept any of these industry requests, GAMA/ASD propose that in any case the retrofit mandate be aligned with the ARAC ROPWG task 6 recommendations. To achieve the latter objective, and except for CS 440 (c), which is considered sufficient and in line with ARAC Task 6 recommendations, EASA is requested to:

a) differentiate the NPA requirements between newly manufactured rotorcraft and in-service fleet, as this should be recognized as a practical approach that allows feasibility for retrofit solutions while still ensuring the maximum safety gains;

b) exclude CS 26.440 (b)(1)(2)(3), CS 26.440 (d) and CS 26.440 (f) from the NPA's applicability to in-service rotorcraft ; and

c) for CS 26.440 (e), consider the retrofit of fuel bladders with a puncture resistance to **250 lbs. only**.

If EASA was to not withdraw the CRFS retrofit mandate, nor limit its applicability to operations such as Part-CAT, nor align with the ARAC ROPWG task 6 recommendations as requested above, then EASA should at least:

a) appropriately evaluate the differential application of requirements for newly manufactured legacy rotorcraft vs. retrofit for in-service fleet; and

b) review the methods of analysis and cost/benefit estimates and analysis for those recommendations in the ARAC ROPWG task 5 and 6 not considered in this NPA.

The recommendations' asymmetrical consideration by EASA implies the cost/benefit estimations and analysis may have substantially changed or are no longer valid for the purposes of this NPA. To support the review of cost/benefit estimates and analysis for those recommendations, GAMA/ASD encourages EASA to set up a joint working group as requested in CRT Comment 81.

response

Noted

EASA has the intention to maintain the same level of protection against fuel tank post-crash fire for newly manufactured and in-service rotorcraft.

250 lb only is a value accepted when the bladder is tested with a surrounding structure.

For partial compliance, the bladder is tested alone with a criterion of 370 lb.

It is important to give credit to design and test with surrounding structure.

The breakaway does not request extensive changes to the existing fuel installation. EASA considers therefore those changes as applicable to the rotorcraft in service.

The same design criteria have been retained for retrofit and newly design rotorcraft. However, the application dates of those requirements are different (2030/2038).



comment 88 comment by: *General Aviation Manufacturers Association (GAMA)*

Comment #6 (merging comments 11, 12, 13 and 14)

Rationale

The ARAC ROPWG task 6 indicates in its page 2 that post-crash fire in survivable crashes can be effectively eliminated through the incorporation of crash resistant fuel bladder technology. The analysis contained in the task report also demonstrates that crash resistant fuel bladders can be cost-effectively installed (retrofitted) on most existing rotorcraft, which the industry fully recognizes.

The summary of recommendations for retrofit proposes US regulations to allow bladder-only drop test (i.e., surrounding structure optional) for CS 27/29.952 (a)(1)(2)(3)(5)(6) compliance. Such a drop test is intended to demonstrate a certain level of resistance, showing the ability of the bladder to withstand stresses, strains, accelerations, and deformations occurring at the moment of impact on the rigid surface.

The proposed EASA CS 26.440 discusses the drop test bladders and, in line with the ARAC ROPWG task 6 recommendations, does not require the drop test be conducted with the surrounding structure. However, the proposed CS 26.440 does not address the specific fuel bladder configuration required for the drop test. In particular, it is not clear if the drop test would require internal components or not.

The FAA under the Permuter amendment has clarified that the fuel bladder can be dropped without internal components (i.e., for bladders that have puncture resistance to 370 lbs, only a bladder-only drop test (with no internal components) is required). Furthermore, the following clarification was provided by the FAA: "If the successful drop test is out of structure, then to demonstrate compliance with the mandate requires a bladder with a minimum puncture force of 370 pounds. This test is not required to contain fuel system components inside the test bladder."

GAMA/ASD, in line with the FAA's interpretation and the ARAC ROPWG task 6 intent, believe that internal components are not part of a bladder-only drop test because:

- a) The bladder tank substantiation, through tests, aims at demonstrating the robustness of the bladder tanks.
- b) The rest of the system is substantiated in parallel, through description, analysis, simulation, and local testing when necessary.
- c) Installation of the internal components inside a bladder will generate hard contacts at impact between the internal hardware (pumps, probe, piping...) much more severe than in a drop with the surrounding structure.

Proposed text/action

GAMA/ASD request EASA:



a) Recognize the need to validate the resistance of the bladder without equipment inside the flexible fuel bladder nor the surrounding structure, in line with the ARAC ROPWG task 6's intent and FAA's interpretation by replacing fuel 'tank' to fuel 'bladder-only' in the final version of CS 26.440 or identifying the configuration of the drop test article in CS 26.440 or in the AMC section of CS 26.440.

For reference, the following rewrite is proposed for "CS26.0440 [...]"

(a) Each fuel tank, or the most critical fuel tank, must be subjected to a drop test that results in no subsequent leakage of the fluid that is contained within it, using the following parameters:"

by *"(a) Each fuel **bladder**, or the most critical fuel **bladder**, must be subjected to a drop test that results in no subsequent leakage of the fluid that is contained within it, using the following parameters:"*

b) Clarify that partial compliance is intended using a drop- tests fuel bladder, without equipment nor surrounding structure, with all openings suitably closed. If relevant, the fuel bladder can be supported in its proper attitude with a lightweight device.

c) Include a definition of 'fuel bladder-only' to avoid misunderstandings between EASA and OEMs. It is proposed the definition read as follows:

"Bladder only configuration shall be clearly defined, as follows:

*" All bladder openings properly blanked by serial caps (if existing) and/or test tooling
No surrounding structure
No internal components"*

response	<p>Partially accepted</p> <p>(a) Accepted. This item will be reviewed and discussed internally.</p> <p>(b) EASA is aligned with the FAA.</p> <p>(c) EASA agrees with the proposal. However, this clarification should be developed in specific guidance material.</p>
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comment	<p>89 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Rationale</u></p> <p>CS26.440 d) requests that <i>"Rigid or semi-rigid fuel tank or bladder walls must be impact and tear resistant."</i> the corresponding AC introduces the distinction between flexible liner and bladder.</p> <p><u>Proposed text/actions</u></p> <p>The definition of flexible liner and bladder shall be clarified and the relevance of CS26.440 d) confirmed for bladder tank walls.</p>
response	<p>Noted.</p>



CS26.440 (d) does not apply to flexible liners.
The text will be revised as follows:
This requirement does not apply to flexible liners.

3.3 Draft guidance material (draft EASA decision)

p. 13

comment	57	comment by: <i>Safran</i>
	<p>Is it possible to have the definition of Bladder wall & flexible liner ? And for which reason the Applicability is different Does the requirements of "impact & tear" applies to a flexible bladder wall enclosed in a rigid fuel tank structure?</p>	
response	<p>Noted. CS26.440 (d) does not apply to flexible liners. The text will be revised as follows: This requirement does not apply to flexible liners.</p>	

GM 26.440(b)(3) Fuel line slack or stretch

p. 13

comment	71	comment by: <i>FAA</i>
	<p>Page Number: 13 Paragraph Number: 3.2.(E)(2) Referenced Text: (2) 1112 N (250 lbs) if the drop test that is required in paragraph (a) is successfully conducted with the tank enclosed in a surrounding structure that is representative of the tank installation that includes any projections or other design features that are likely to contribute to the rupture of the tank.</p> <p>Comment/Rationale or Question: In some cases the fuel tank is installed in the baggage compartment. In those situations should the content of baggage compartment be considered surrounding structure as they have a potential to penetrate the tank?</p> <p>Proposed Resolution: Clarify that "any projections" in 3.2.(E)(2) include penetration risk of the baggage contents to the fuel tank installations. Comment Type: Conceptual</p>	
response	<p>Noted The design review will include the identification of any potential projections which include baggage contents.</p>	

4.1. What is the issue

p. 14



comment	32	comment by: <i>LBA</i>
	<p><u>LBA comment; Page 14; Table 1:</u> There is a discrepancy between the numbers within the CS-27 fleet: 100 % equates to 4847 helicopters 65 % equates to 3150 helicopters 35 % equates to 1697 helicopters You mention other numbers in figure 1.</p>	
response	<p>Not accepted.</p> <p>65 % and 37 % are rounded up values. The number of compliant CS 27 rotorcraft is 3 130 helicopters — see Figure 1. The number of compliant CS-29 rotorcraft is 353 helicopters (37 % of 963 rotorcraft) — see Figure 1.</p>	

comment	33	comment by: <i>LBA</i>
	<p><u>LBA comment; Page 15; Figure 2:</u> How do you define a “compliant type” and a “non-compliant type in production” and a “non-compliant type no more in production”? A type summarises several models which could be in or out of production and for which a retrofit could be available or not or which showed compliance with the CRFS or not. By the way the product list – rotorcraft mentions 53 types not 62 which is the sum of all items of figure 2.</p>	
Response	<p>Noted</p> <p>It is correct that a type is potentially made of numerous models. The fuel tank system configuration of each rotorcraft must be identified to determine its compliance with the CRFS requirements. The TCH/STCH will provide assistance if applicable.</p>	

comment	58	comment by: <i>Safran</i>
	<p>in the table, does "EU rotorcraft fleet" include also UK fleet ?</p>	
response	<p>Noted</p> <p>Part 26 does not apply to UK-registered products.</p>	

comment	70	comment by: <i>FAA</i>
	<p>Page Paragraph</p>	<p>Number: 14 Number: 4.1</p>
	<p>Referenced Text: The results of accident investigations have provided evidence that rotorcraft that do not comply with the latest occupant protection requirements are more likely, in an otherwise survivable crash, to result in a fatal accident (multiple loss of lives) due to a post-crash fire. Indeed, SRs have been addressed to EASA to require the</p>	



	<p>incorporation of CRFSs into newly manufactured rotorcraft and/or to retrofit the existing rotorcraft fleet. A list of relevant SRs that are addressed to EASA can be found in Section 2.1 under 'Realted Safety Issue'.</p> <p>Comment/Rationale or Question: "Realted safety issue" may be a mis-spelled. Should that be "Related safety issues"?</p> <p>Proposed Resolution: Please correct.</p> <p>Comment Type: Editorial</p>
response	Accepted
comment	<p>91 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Rationale</u></p> <p>With respect to Note 14: "<i>The total fleet is based on 2020 data for all 32 member states, including United Kingdom</i>". The UK is not part of the EASA system since January 1st, 2021, therefore the consideration of UK fleet data to support the conclusions of this NPA is no longer appropriate and can distort the understanding of the overall EU impact.</p> <p><u>Proposed text/action</u></p> <p>The UK fleet shall be removed, both from starting 2020 fleet figures (e.g. Table 1, Figure 1-2; Table 2-3-4; Figure 3) as well as from affected fleet evaluations for the proposed Options (Table 5; Figure 4-5; Table 6-7). EASA should also review, consequently, CBA results (for both expected costs and expected benefits).</p>
response	<p>Noted</p> <p>At the time of investigations, the UK was an EU Member State. The UK fleet is representative of rotorcraft flying in the EU. As they share similar requirements, it is fully relevant to consider the UK fleet for this analysis.</p>
comment	<p>92 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Rationale</u></p> <p>In relation to the following statement in p.14:</p> <p><i>"The results of accident investigations have provided evidence that rotorcraft that do not comply with the latest occupant protection requirements are more likely, in an otherwise survivable crash, to result in a fatal accident [...] due to a post-crash fire."</i></p> <p>Section 2.1 provides a list of SRs. According to Section 2.1, SRs have been raised in the frame of investigations relevant to certain rotorcraft models. It should therefore be highlighted that some other models, although not equipped with crash resistant fuel systems, were not contributing to any SR <u>related</u> to CRFS. A statistical analysis of the models whose accidents drove the SRs is highly recommended, together with a detailed</p>

review of their Fuel System and Fuel Tank design to better define which non-CRFS design is more likely prone to post crash fire after a survivable impact.

This analysis can better support and/or refine the proposed strategy for implementation into service (e.g. ARAC ROPWG Task 5: "*a crash-resistant fuel bladder is the most significant component of an effective CRFS*").

Proposed text/action

EASA is encouraged to set up a joint working group with industry as proposed in CRT Comment No. 81 to revise the list of partial compliance requirements that were listed for the ARAC study. If EASA would not compose the WG, it is suggested to edit the sentence as follows:

"The SRs show that some rotorcraft models that are not required to comply with the latest occupant protection requirements and that are fitted with a similar specific fuel tank and fuel system design configuration provide a low level of occupant protection in case of survivable crash."

response

Not accepted

Any models not designed with a fuel tank crash protection system will be significantly more exposed to post-crash fire compared to compliant models.

The SRs do not specifically refer to one model but recommend corrective actions on non-compliant rotorcraft.

Regarding the working group, see the response to comment #81.



4. Impact assessment (IA)

p. 14

comment

47

comment by: *Andri Senn*

Position on Crash Resistant Fuel Tanks (NPA 2022-10)

Introductory remarks

We Heli-Linth AG welcomes the opportunity to comment on the 'Notice of Proposed Amendment (NPA) 2022-10, Improvement in the survivability of rotorcraft occupants in the event of a crash – Phase 1 – Crash Resistant Fuel Systems. This proposed regulation would require that operators ensure crash resistant fuel systems (CRFS) are installed in all helicopters operating in the EU. While Heli-Linth AG welcomes this initiative and the potential safety benefits, in its current form it will lead to significant consequences that could have major adverse effects on our company. Heli-Linth AG, therefore, is opposed to the selected option in this new NPA.

Heli-Linth AG does not contradict the basic premise and the usefulness of CRFS, the argument against this proposed regulation is economic and the fact that the risk would be transferred to other parts of the global aviation community.

The proposed regulation will destroy between 300 to 400 million euros in book value across the entire European helicopter industry. This is a massive external shock on the balance sheets of Heli-Linth AG that cannot be mitigated. The proposed requirements for CRFS therefore must remain an option so that we can choose based on our economic viability to install such a system. The extended timeline of 15 years does not change the legal requirement that we have to mark the value of the assets effectively and fairly in our balance sheets. The drop in value would be immediate and will be accounted for as soon as the law enters into force. In the current economic environment, this is a shock that would be almost impossible to compensate. In any case, we would have to review existing programs to enhance safety in order to best allocate our resources.

Heli-Linth AG requests that the proposed option selected is Option 1, detailed on Page 21 of the NPA, and reads as follows CRFS "Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured aircraft that are operated or registered in Europe". Option 1 was identified in the NPA as the most cost effective option "Option 1 is the most cost-effective option: the cost per prevented fatality is significantly lower for the production cut-in of new deliveries compared to any of the other options...". There must be no requirement to retrofit older models.

The rationale for this position are as follows:

As highlighted above, the implementation of any other option would have significant economic consequences on our balance sheet and ability to invest in safety enhancing programs. It would send a shock through our company and lead to unintended negative consequences on the viability and the financial situation. The NPA estimates the recurring cost to be in the order of between EUR 131,000 to EUR 294,000 per aircraft (greater than 2,000 aircraft affected). Clearly, this will have an impact on the financial position of Heli-Linth AG. It's hard to imagine how we and other companies operating three or more helicopters will be able to absorb an asset loss of up to a million euros or even more. Overall,



it is hard to understand how a law can come into effect where the immediate mark down will be between 300-400m Euro across the industry.

The average costs of an upgrade kit, even if one is available, cannot be recouped in the current environment through an increase in revenues. Based on an average cost of an upgrade kit of EUR 150,000 per aircraft. We would have to generate 360'000 EUR more per year to earn the investment over the time given. This is simply not feasible in the current environment. The effects of Option 1 will still be applicable until the upgrade has been made, therefore doubling the impact on operators. Loss in value and significant investments without an increase in value of the asset (helicopter). One sector where many of these legacy types are utilised is in the provision of aerial firefighting, this capability will be affected massively.

The adoption of a retrofit requirement will lead us to sell-off into countries where there is no regulatory requirement for CRFS. Therefore, we will be exporting the problem. The risk from these legacy helicopters does not go away. It would be just transferred. It would be better to keep these aircraft within the regulatory framework of Europe where there is a high standard of maintenance and mature operating procedures where they would present less of risk due to the lower accident rate.

This proposed requirement will lead to different standards compared to the United States. This in turn creates an additional burden on the OEMs, whom must manage the requirements of several jurisdictions. Exemptions granted in one jurisdiction cannot be applied in another jurisdiction. This leads to a potential loss of legal certainty and investments already taken to upgrade existing fuel tank systems may have to be re-evaluated and written off. Also, it is not yet clear if the supply chain will be able to produce and install the required number of upgrade kits to their fleet within the times allocated in the NPA. Indeed, some aircraft types are never likely to see retrofit kits designed for them due to negative business cases or technical restrictions.

Heli-Linth AG would like to point out that the economic impact analysis of this regulation is misleading and does not capture the full effect on the balance sheet, running cost and potential value of the helicopter and companies, as a whole. We strongly urge the regulator to take a more holistic approach regarding economic impact and take all financial aspects into consideration. An incomplete economic analysis might lead to wrong decisions that could have a massively negative effect on European operators, especially small to medium-sized companies.

Heli-Linth AG also would like to point out that every euro invested in additional safety features needs to be earned first. In the current economic environment with rising interest rates, rising costs for fixed as well as variable costs items, the pressure on operators is ever increasing. When drafting regulations, the regulator also must take into consideration the market situation and the market potential for generating the required revenues that will cover these additional costs. The regulator cannot ignore these economic realities.

Heli-Linth AG does not dismiss the need for improving safety. However, Heli-Linth AG considers there must be a balance between increased safety and economic feasibility. In conjunction with massive administrative burden, it is increasingly hard for small operators to serve their communities and provide essential services to Europe and the people that live within its borders. This cannot be in the interest of the regulator and European Community.



As a general principle, Heli-Linth AG would like to see financial support made available to operators to encourage rapid installation of available technologies where economic imperatives may otherwise prohibit adoption. Closer alignment between the European Plan for Aviation Safety, Member States' Safety Plans and funding programmes such as Horizon Europe provide an ideal opportunity to maximise the impact of the adoption of EASA derived safety initiatives, such as CRFS in smaller aircraft.

Requested texts of regulation 26.440:

26.440 Fuel system crash resistance

(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after *[1 year after the date of entry into force]* shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

~~(b) Operators of small helicopters and large helicopters that are designed for five or more occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.~~

~~(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.~~

Requested addition to text (bold font and underlined) of certification specification CS 26.440:

CS 26.440 Fuel system crash resistance

[...]

(b) Self-sealing breakaway fuel line couplings must be installed unless hazardous relative motion of fuel system components to each other or to local rotorcraft structure is demonstrated to be extremely improbable or unless other means are provided. The couplings or equivalent devices must be installed at all fuel tank-to-fuel line connections, tank-to-tank interconnects, and at other points in the fuel system where local structural deformation could lead to release of fuel.

(1) The design and construction of self-sealing breakaway fuel line couplings must incorporate the following design features:

(i) The load necessary to separate a breakaway coupling must be between 25 % and 50 % of the minimum ultimate failure load (ultimate strength) of the weakest component in the fluid-carrying line. The separation load must in no case be less than 1334 N (300 lb), regardless of the size of the fluid line. **A breakaway load less than 1334 N within the 25% to 50% range may be used if the installation includes features preventing a load larger than the breakaway load from being applied to the coupling inadvertently.**

response Not accepted

See the response to comment #20.



comment 90

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

The NPA does not include uncertainty quantification and sensitivity analysis. This evaluation is essential to understand the confidence of Cost-Benefit Analysis results of the proposed options. Data-driven decisions can be flawed if not properly supported with the uncertainties associated with CBA results.

It is supported by the European Commission (as well as other means/methods, like the Discount Factor/NPV already included in the NPA) that uncertainty shall be presented as part of the "relevant information to support decision-making" (ref. page 32 Chap. IV - Impact Assessment of European Commission's Better Regulation Guidelines).

Also, please note for reference the following tools of the Commission's better regulation guidelines:

- ref. Tool #4 - Evidence-Informed Policymaking of European Commission's Better Regulation Toolbox. "The likely uncertainty in the key findings and conclusions and how these might affect the choice of preferred option should be analysed (potentially by sensitivity analysis)."
- ref. Tool #11 - Format of the Impact Assessment Report; Section 7 - How do the options compare? The European Commission provides the full list of information that "must be included in the impact assessment report", like Annex 4 - Analytical methods used in preparing the impact assessment, which shall include "Explanation of the likely uncertainty in the analytical results and the likely robustness of the results to changes in underlying assumptions or data inputs;"
- Ref. tool #61 "Account for uncertainty in model results" - Simulation Models; 2. TRANSPARENCY AND QUALITY ASSURANCE; Box 2: Steps of model use for impact assessment; of European Commission's Better Regulation Toolbox.
- Ref. Tool #65 – Uncertainty and Sensitivity Analysis:
 - Why - A transparent and high-quality impact assessment should acknowledge and, to the extent relevant or possible, attempt to quantify the uncertainty in results as it could change the ranking and conclusions about the policy options."



- "Good and transparent practice in providing evidence for policy support requires that uncertainty be quantified and considered as much as possible (uncertainty analysis)
- "Different sources of uncertainty can affect the results. These sources of uncertainty should be accounted for and – where the type of evidence allows – quantified, and the most relevant ones should be identified and reported."

In addition, to highlight the importance of uncertainty quantification and sensitivity analysis for this NPA, the ARAC ROPWG Task 5 report, page 35 also indicated: "Since there were relatively few accidents in the dataset where it was determined that CRFS would have been of likely value for at least one occupant, the number of preventable thermal fatalities and injuries in the dataset, and the resulting benefit calculation, could by random chance be higher or lower than what would be expected on average. For instance, a single avoided accident could have reduced the calculated benefit by up to 60 percent."

Proposed text/action

In line with the European Commission's recommendations for better regulation, uncertainty quantification and sensitivity analysis shall be included in the NPA. EASA is encouraged to set up a working group together with industry tasked to investigate quantitative data that supports an appropriate analysis for this NPA, including uncertainty quantifications and sensitivity analysis, in line with GAMA/ASD's CRT Comment No. 81. If EASA decides not to compose the proposed WG, the agency should in any case make this analysis and include it in the upcoming Opinion.

response

Not accepted

The impact assessment highlights several uncertainties, notably around the potential number of fatalities that could be prevented through the different options under consideration. While all options have a negative net present value, meaning that their costs outweigh the benefits of prevented fatalities, there are significant variations between them.

It is worth noting that the assessment examined factors beyond the cost-benefit analysis, in order to arrive at a comprehensive evaluation of the options.

4.1.1. Safety risk assessment

p. 16

comment

17

comment by: *SHeV*

The connection to the overall situation is missing. The problem of "fire" would be put into perspective.



response	Not accepted Several parts of the impact assessment, including Section 4.1, clearly state that the objective is to prevent fatalities caused by post-crash fire in otherwise survivable accidents.
comment	30 comment by: LBA LBA comment; Page 17: table 2: The period of time to which these accident data are related should be mentioned
response	Noted The accident data used in the table was extracted from Task 6 of the Rotorcraft Occupant Protection Working Group (ROPWG). The period covered in the data ranges from 2009 to 2017.
comment	34 comment by: LBA <u>LBA comment; table 2:</u> The comparison between the accidents in Europe and the US is considered as improper because the operation of helicopters and the factors which influence the events of the accidents differ significantly between both regions.
response	Noted. The assessment of the European fleet based on US accidents and fatalities was just one of the methods that were used and taken into account during the analysis. Table 4 on page 18 provides a range of fatalities that could have been prevented as a result of the various methods used.
comment	35 comment by: LBA <u>LBA comment; Page 18; Table 4:</u> Two approaches were presented. So, the expectation is that the range of preventable fatalities should be 11-21 (CS-27) and 2-8 (CS-29) and 13-29 (Total). So, there seem to be inconsistencies between the numbers described in section 4.1.1. (text) and in the summarising table 4.
response	Noted To account for the uncertainty surrounding the number of fatalities for CS-29, we made the decision to include a minimum value of 1. Although we could have potentially used a value of 2 from Table 3, it was also subject to uncertainty, as explained in the accompanying footnote.

comment	93 comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	<p><u>Rationale</u></p> <p>It must be highlighted that the aim of 27/29.952 is to reduce the risk of post-crash fire in case of survivable crash. The evaluation/consideration/comparison should start with this baseline: if a fatality occurred in a non-survivable crash, it should not be considered for the purposes of this evaluation.</p> <p><u>Proposed text/action</u></p> <p>EASA to exclude data from non-survivable crashes for this analysis.</p>
response	<p>Not accepted</p> <p>There are accidents where there is uncertainty whether the occupants could have survived if there had been no post-crash fire. The analysis aimed to include only survivable crashes.</p>
comment	94 comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	<p><u>Rationale</u></p> <p>In relation to the following statement in p.17:</p> <p><i>"Due to the different fleet size and distribution of the types/models of the EU rotorcraft fleet, a comparison with the US accidents and fatalities could not be directly drawn. However, it is possible to use rudimental interpolation based on a comparison of the fleet size to establish the order of magnitude of the preventable fatalities"</i></p> <p>Establishing the order of magnitude means defining if the estimated value could be in the order of 10 or 100. In this NPA, instead, the "<i>rudimental interpolation</i>" which is explicitly said to be extremely rough or even wrong ("<i>a comparison [...] could not be drawn</i>") is then used to define the exact number of 8 prevented fatalities for CS-29 that is used for the following evaluation of safety benefits for all the proposed Options.</p> <p><u>Proposed text/action</u></p> <p>EASA should remove the "<i>rudimental interpolation</i>" of the US fleet from this NPA, and instead perform a deep and detailed evaluation on EU fleet similar to what ARAC ROPWG developed for the US fleet. Otherwise, "<i>rudimental interpolations</i>" and all the other methods used in order to obtain rough estimates of prevented fatalities should be presented together with the evaluation of their uncertainties and when used for CBA calculations. Uncertainties propagation should be considered and explicitly reported, in order to properly evaluate the results. This is in line with GAMA/ASD's CRT comment 90.</p>
response	<p>Partially accepted</p> <p>'The order of magnitude' is meant to refer to the approximate amount of a number and not a change where each level is 10 times higher (or lower) than the one before.</p>



The uncertainty of the estimate is a result of the limited information available in accident reports and this is clearly stated.

comment	95	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	<u>Rationale</u>	
	The CS 29 accidents and subsequent fatalities for survivable crash is 0. The assumption of 2 is not supported by data and it seems that it has been taken as a further conservatism in the analysis.	
	<u>Proposed text/justification</u>	
	EASA to consider removing this contributor.	
response	Not accepted	
	Footnote 12 explains on what assumptions the estimate is based.	

4.1.3. How could the issue evolve p. 19

comment	18	comment by: <i>SHeV</i>
	4.1.3 ...A new type is assumed to appear on the market every year and then the oldest type is assumed to go out of production....	
	Feedback: One new type per year is too unrealistic and cannot be included in a calculation. The increasingly stringent regulations extend the development time. The SHeV recommends setting the deadline for helicopters with five or more persons to twelve years to allow enough time for a serious implementation of CRFS compliant systems.	
response	Noted	
	The assumption of one new type per year is based on historical data. If the appearance of new types takes longer, then non-compliant types are going to stay longer in production, therefore the share of compliant helicopters is going to increase more slowly. This would only increase the potential benefits of the analysis.	

comment	37	comment by: <i>LBA</i>
	<u>LBA comment; figure 3:</u> Does this prediction also consider the requirements in the USA to install a CRFS? There is no step in the values.	
response	Noted.	



Figure 3 shows the fleet development in the case of Option 0, the do-nothing scenario. It takes into account the requirements applicable to EASA-Member-State operators and the characteristics of the current and future types in service. Predictions on requirements developed by the USA cannot be integrated into the analysis.

comment 97 comment by: *General Aviation Manufacturers Association (GAMA)*

Rationale

In relation to the following statement: "A new type is assumed to appear on the market every year": the assumption of one new type every year is not realistic.

Historical data of new type certifications in Europe does not support this statement; e.g. other EASA Preliminary Impact Assessment (PIA) assume new CS-27 and CS-29 types every 8 or 10 years respectively, as well as previous EASA NPAs (e.g. ref. NPA 2021-02 - Rotorcraft occupant safety in the event of a bird strike; page 16, 4.4.2 (5): "Based on historical data, EASA assumed that new types [...] rotorcraft will be launched onto the market every 10, 10, and 7 years respectively") which seems to be more in line with actual European historical data. Of course, the results of the proposed Cost-Benefit Analysis (CBA) are strongly dependent on this assumption.

Proposed text/action

EASA should clarify and publish the supporting data for this assumption. Alternatively, EASA should review this assumption with a more realistic forecast of new type certifications yearly rate, and review CBA results accordingly.

response Noted.

See the response to comment #18.

EASA NPA 2021-02 proposes a longer period for new types entering the market because it does not include the whole civil helicopter fleet, only three small subsets of it (tiers 1, 2 and 3).

comment 98 comment by: *General Aviation Manufacturers Association (GAMA)*

Rationale

There is no justification for using the upper end of the scale instead of an average value between the results from the 3 estimating methods. Preventable fatalities have been estimated using 3 different methods, each of them with very high uncertainty levels; and then building the envelope of maximum value. Even using the upper end of the scale of the estimated preventable fatalities (ultimate potential benefits), CBA shows negative NPV values for all the Options proposed.

Proposed action/text



	<p>Add justification for using the upper end of the scale to check the economic viability of the different options; and since economic viability is not reached even in this extreme benefit estimation, more likely/realistic NPV results should also be included in the NPA (e.g. estimating benefits by using an average value between the results from the 3 estimating methods).</p>
response	<p>Noted</p> <p>Even when using a higher estimate of potential benefits, the cost-benefit analysis (CBA) yielded a negative net present value (NPV), indicating that the estimated costs are likely to exceed the benefits, particularly in scenarios with lower fatality estimates.</p>



4.1.2. Who is affected

p. 19

comment	<p>36 comment by: <i>LBA</i></p> <p><u>LBA comment; Page 19:</u></p> <p>Operators performing NCO operation would not be affected by Part 26 requirements in our understanding. Therefore the assumption that this requirement would affect all operators seems to be not applicable.</p> <p>In Article 3 of regulation 2015/640 (last consolidated version) it is determined that Part-26 is only applicable to operators, which are under the oversight of a member state.</p>
response	<p>Noted</p> <p>The criteria introduced for the corrective action are established considering the number of occupants. The operation aspects have not been selected as criteria for the applicability. Therefore, all the operators registered in the EU will be impacted. It is correct that Part 26 applies to operators which are registered in the EU.</p>
comment	<p>96 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Rationale</u></p> <p>Any retrofit option including the entire EU fleet will inevitably generate disruption on the EU used helicopters market. The residual value of in-service aircraft with no CRFS retrofit option available will drop, or even reach zero. This might generate dramatic consequences for small operators (approx. 605) that have only 1 rotorcraft in its fleet and are non-CRFS compliant as they may be forced to suspend operations if they cannot afford a new CRFS rotorcraft.</p> <p>It should be noted that the '<i>risk to business continuity of some rotorcraft operators</i>' highlighted in the CBA results for Option 1 is not as relevant as it would be for Option 2-3 or 4-5. In Option 1, it would depend on cases of crashes with post-crash fires only, which is not the case for the other options.</p> <p><u>Proposed text/action</u></p> <p>EASA to:</p> <ol style="list-style-type: none"> 1. include estimates of the costs associated with loss of residual value for older types still in-service; 2. assess the number of operators with only one rotorcraft non-CRFS compliant; 3. evaluate the risk of EU operators that could be forced to shut down operations and estimate the costs (both economic and social) and include them in the CBA. 4. Remove the sentence '<i>This poses a risk to the business continuity of some rotorcraft operators</i>' from the option 1 CBA results and explicitly add <i>the 'risk to business continuity'</i> for Options 2-3 and 4-5.



response Partially accepted

These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.

4.3. How we want to achieve it - options

p. 20

comment 38 comment by: LBA

LBA comment; table 5:

The numbers in the last row are confusing. The whole existing EU rotorcraft fleet is affected in options 0, 3 and 5. Therefore it is not clear why different numbers of types and rotorcrafts are mentioned in this last row.

Or do you really expect that in Option 3 until 2030 12 types will disappear and in Option 5 until 2038 the same number?

Why are the affected rotorcraft in option 0 less than in option 3?

Furthermore, it seems that these numbers of the last row does not fit with numbers of figure 5 of section 2.1.

It is not clear why the model specific measure is no option. (e.g. Airworthiness Directive for all models with a post-crash-fire issue).

It is not clear why the final solution (3 steps) is no option in section 4.3 and 4.5 and then consequently in 4.6.

response Not accepted

The model takes into account two factors. First, some types are going to be out of production by 2030 and 2038, and second, some types are going to have a very small fleet (less than 10 helicopters) with a very high average age. Those types are also excluded from the number of relevant types.

These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.

comment 64 comment by: FAA

Page Number: 21
 Paragraph Number: 4.3
 Referenced Text: Options in Table 5

Comment/Rationale or Question: The draft regulation, the combination of paragraphs 3.1(a)(b) and (c), does not seem to match with any options presented in Table 5.

Proposed Resolution: Add proposed regulation to the CBA. Option 4 plus: as of 2038, retroactive application of CRFS requirements to the whole existing EU rotorcraft fleet

Comment Type: Editorial



response	<p>Not accepted</p> <p>Option 4 plus was not retained as EASA considered that corrective actions should be applied more rapidly on the large occupant capability rotorcraft (more than 5 occupants).</p> <p>The application date should be aligned with the date of approval of the new Part-26. 2038 cannot be proposed.</p> <p>These concerns were discussed with industry and NCAs during workshops and seminars. Updated options and time frames have been agreed.</p>
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4.4.1. Methodology applied

p. 22

comment	<p>59</p> <p style="text-align: right;">comment by: <i>Safran</i></p> <p>Is it possible to get access on the assumptions and methods used to build the cost estimation</p> <p>Concerning operating costs, is it possible to have some explanations about these costs because it seems high : Fuel cells are "ON Condition" and the delta of weight seems negligible</p>
response	<p>Noted</p> <p>The costs have been derived from the ARAC study as explained in Section 4.4.1. The European stakeholders have contributed to this evaluation. It is presumed that the costs have been conservatively estimated.</p> <p>The delta of weight is not negligible for rotorcraft and has a direct impact on operational costs, payload and range.</p>
comment	<p>99</p> <p style="text-align: right;">comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Rationale</u></p> <p>The NPA seems to be missing references for values of "<i>non-recurring costs per type, still-in-production types: EUR 0.5 million (CS-27) and EUR 1 million (CS-29) per type</i>". ARAC ROPWG Task 5 report (ref. Table 22, page 56 of ARAC Task 5 Final Report) only includes a total of 7.9 million USD for still-in-production Part 27 single turbine models, and 71.7 million USD for Part 29 models, which are both the sum of non-recurring-costs for all the still-in-production models within each category.</p> <p>Assuming that each Part-29 OEM that participated to the ROPWG provided its own estimates for their still produced twin turbine rotorcrafts (not already CRFS-compliant), this would lead to an orientative value of 20-30 million USD per Type: how did EASA come up with EUR 1 million only?</p> <p><u>Proposed text/action</u></p>



	EASA should check and provide references and clarifications for the reported values of non-recurring costs, still-in-production types: EUR 0.5 million (CS-27) and EUR 1 million (CS-29) per type.
response	<p>Not accepted</p> <p>A distinction has been made between the non-recurring costs of in-production and out-of-production rotorcraft. For newly produced rotorcraft (still in production), the cost estimates were based upon the assumption that these would be minimal (see the ARAC report).</p>
comment	<p>100 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Rationale</u></p> <p>In relation to the following sentence in p.23 and p. 36 (footnote): "<i>all financial values were discounted to year 2020, using a 4-% discount rate</i>".</p> <p>The values from ARAC ROPWG are in 2016-USD. The reference value for prevented fatalities of 3.8 million seems to be based on USD 3.6 million in 2005-USD. If this is the case, it should be noted. Values reported in the table for Value of Prevented Fatalities (VPF) do seem to consider only 4% discount from 2020 to 2050, without accounting for the 2005-2020 period.</p> <p>For reference: "<i>Better regulation Toolbox</i>" (pages 287-8): "<i>The Value of Statistical Life (VOSL) is derived [...] to better understand the right values to use in policymaking. It proposed a range for the average adult VOSL for the EU of USD 1.8 million – 5.4 million (2005-USD), with a base value of USD 3.6 million.</i>".</p> <p>In addition, €/ \$ exchange rate is not reported, and it is not clear from the NPA if the discount rate has been correctly applied to all contributing factors.</p> <p><u>Proposed text/action</u></p> <p>The details and assumptions should be included and provided in the NPA for the public to understand and comment appropriately. EASA should verify and amend VPF and resulting NPV for all the provided options.</p>
response	<p>Noted</p> <p>The value of prevented fatalities is not based on the ARAC report. It is a standard value used in EASA impact assessments.</p> <p>US dollar values were converted to euro values using the annual average exchange rate of the European Central Bank.</p>
comment	<p>101 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Rationale</u></p>

With respect to the following sentence: "Overall, it is expected that 5% of the EU fleet that is produced for both the US and EU market may benefit from its compliance with the US requirements."

Do the forecast figures reported in Figure 3 (page 20) take into account any portion of EU fleet that is going to implement CRFS-compliant retrofit KIT that are already available, even without any policy change? This portion had been very low (or even near zero), but EASA should consider the effects of the Safety Promotion that EASA and ESPN-R developed. This quote should not be null, otherwise EASA Promotion is assumed to be completely ineffective. Other-than-zero effects should be included: the assumed quote should be explicitly reported in the NPA and included in the forecasts for Option 0.

Proposed text/action:

EASA should include estimates of the EU fleet quote that is going to implement the available CRFS solutions, even if not compulsory, and consider the effects (or lack thereof) of safety promotion efforts.

response

Noted

Crash protection system modifications and STCs have been developed for some products but are rarely implemented as the requirements were not compulsory.

4.5.1. Option 0 - No policy change

p. 24

comment

39

comment by: LBA

LBA comment:

It seems that this option 0 does not include the US CRFS requirements.

response

Noted

The implementation of the CRFS has been required by US law.

The US law applies only to US-registered rotorcraft. A marginal impact on the European fleet is expected. Therefore, it is valid to not include the US CRFS law for Option 0.

comment

102

comment by: General Aviation Manufacturers Association (GAMA)

Rationale

In relation to:

- the sentence in p.24: "[...] there would be a regulatory difference with the US/FAA that have mandated compliance with the CRFS requirements for newly



response	<p><i>manufactured rotorcraft [...] This may negatively affect European manufacturers and operators that will have to follow two different regulatory frameworks"; and</i></p> <ul style="list-style-type: none"> the sentence in p.26: <i>"The US law creates a difference between the FAA and EASA [...] thereby creating a safety difference between the respective fleets."</i> <p>OEMs would not be negatively impacted by Option 0 as they have already developed KITS for the US market and have different 'basic' configurations in the US/EU. Evidently, there will be negative effects for OEMs if there is now a mandate to develop CRFS retrofit KITS for rotorcraft types that are not in production anymore.</p> <p>Each proposed Option, except for Option 1, would create a new regulatory difference between Europe and the US and it would add safety differences between respective fleets in terms of CRFS requirements. This is the <i>"factor that needs to be considered"</i> when evaluating Option 1.</p> <p><u>Proposed text/action</u></p> <p>Negative effects on OEMs should not be mentioned for Option 0. Negative effects on OEMs should be mentioned only for Options 2-3-4-5. EASA should correct the paragraph in p.26 as follows considering that Option 1 is the only option that would not create a regulatory difference between the US and the EU:</p> <p><i>"From 2020, US law has created a difference between US and EU, requiring newly produced rotorcrafts in the US to be compliant (or partially compliant) with the CRFS requirements, thereby creating a safety difference between the respective fleets. Option 1 would solve this difference, harmonizing EASA requirements to US requirements"</i></p>
	<p>Accepted</p> <p>It is true that Option 1 will harmonise EASA requirements and US law. Options 2 to 5 will further develop EASA requirements. It is expected that the US will also develop additional conditions for fleet in service.</p>

4.5. What are the impacts	p. 24
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comment	<p>46</p> <p>comment by: <i>British Helicopter Association</i></p> <p><i>"Furthermore, if no action is taken in Europe, there would be a regulatory difference with the US/FAA that have mandated compliance with the CRFS requirements for newly manufactured rotorcraft that are operated or registered in the US. In addition, this may negatively affect European manufacturers and operators that will have to follow two different regulatory requirements"</i></p>
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European OEMs to my knowledge will not manufacture any helicopter that does not have a CRFS included in the build standard, from about 3 years time. It is no longer an optional extra and the customer does not get to opt out. The NPA will now introduce a different standard between the FAA and EASA creating new problems for the OEMs. Accepting the ARAC requirements would have ensured commonality. Some OEMs have already designed and certified CRFS prior to this NPA and they have been shown to be effective through experience, for example the R22. While EASA could be applauded for introducing an exacting standard, the limits for items like couplings means that there will have to be a re-design and further testing. This will not help the operators of these helicopters where they have already invested in one CRFS to now have to invest further money in another kit, for no apparent gain. It is recommended that if an OEM or certified 3rd party has demonstrated through experience that a pre-NPA CRFS is effective then an equivalent level of safety release should be granted. Any new CRFS retro-fit kit or newly certificated aircraft should be subject to the limits and test parameters in the NPA.

response

Noted

Effort has been made in the preparation of Part-26 to request the implementation of CRFS compatible with the conditions required in the US law.

It is expected that already approved CRFS installations will comply with Part-26.

comment

76

comment by: *European Helicopter Association*

The methodology does not consider the impact on the balance sheet of the company. This impact will be significant and in no way proportionate to the expected safety benefit. The entire impact analysis is therefore incomplete and misleading.

response

Not accepted

The recurrent and non-recurrent costs have been estimated in the analysis. However, it is difficult to evaluate the individual financial impact on each company.

comment

103

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

Rationale

The ARAC ROPWG recommended the 'US congress to offer tax credits and/or other financial incentives to all rotorcraft operators for installing [...] and/or upgrading to helicopter models'. This could be an option for the European market too, as already proposed in the EASA Rotorcraft Safety Roadmap, by means of subsidies, incentives or tax credits provided by the European Commission/Parliament.

Proposed text/action

EASA together with appropriately competent government bodies is encouraged to consider supporting real market incentives such as subsidies and/or tax credits for OEMs/Operators to manufacture and adopt CRFS retrofit options. This would allow operators to upgrade their own fleet with optional CRFS KITS that are already available.



response

Noted

However, EASA is dedicated to aviation safety and has a limited power regarding this type of action.

4.5.2. Option 1 - Minimal changes to introduce retroactive CRFS requirements for newly manufactured rotorcraft

p. 25

comment

19

comment by: FHS

We (ROBERT FUCHS AG / FUCHS HELIKOPTER) welcomes the opportunity to comment on the 'Notice of Proposed Amendment (NPA) 2022-10, Improvement in the survivability of rotorcraft occupants in the event of a crash – Phase 1 – Crash Resistant Fuel Systems. This proposed regulation would require that operators ensure crash resistant fuel systems (CRFS) are installed in all helicopters operating in the EU. While (ROBERT FUCHS AG / FUCHS HELIKOPTER) welcomes this initiative and the potential safety benefits, in its current form it will lead to significant consequences that could have major adverse effects our company. (ROBERT FUCHS AG / FUCHS HELIKOPTER), therefore, is opposed to the selected option in this new NPA.

(ROBERT FUCHS AG / FUCHS HELIKOPTER) does not contradict the basic premise and the usefulness of CRFS, the argument against this proposed regulation is economic and the fact that the risk would be transferred to other parts of the global aviation community.

The proposed regulation will destroy between 300 to 400 million euros in book value across the entire European helicopter industry. This is a massive external shock on the balance sheets of (ROBERT FUCHS AG / FUCHS HELIKOPTER) that cannot be mitigated. The proposed requirements for CRFS therefore must remain an option so that we can choose based on our economic viability to install such a system. The extended timeline of 15 years does not change the legal requirement that we have to mark the value of the assets effectively and fairly in our balance sheets. The drop in value would be immediate and will be accounted for as soon as the law enters into force. In the current economic environment, this is a shock that would be almost impossible to compensate. In any case, we would have to review existing programs to enhance safety in order to best allocate our resources.

(ROBERT FUCHS AG / FUCHS HELIKOPTER) requests that the proposed option selected is Option 1, detailed on Page 21 of the NPA, and reads as follows CRFS "Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured aircraft that are operated or registered in Europe". Option 1 was identified in the NPA as the most cost effective option "Option 1 is the most cost-effective option: the cost per prevented fatality is significantly lower for the production cut-in of new deliveries compared to any of the other options...". There must be no requirement to retrofit older models.

The rationale for this position are as follows:

1. As highlighted above, the implementation of any other option would have significant economic consequences on our balance sheet and ability to invest in



safety enhancing programs. It would send a shock through our company and lead to unintended negative consequences on the viability and the financial situation. The NPA estimates the recurring cost to be in the order of between EUR 131,000 to EUR 294,000 per aircraft (greater than 2,000 aircraft affected). Clearly, this will have an impact on the financial position of (ROBERT FUCHS AG / FUCHS HELIKOPTER). It's hard to imagine how we and other companies operating three or more helicopters will be able absorb an asset loss of up to a million euros or even more. Overall, it is hard to understand how a law can come into effect where the immediate mark down will be between 300-400m Euro across the industry.

2. The average costs of an upgrade kit, even if one is available, cannot be recouped in the current environment through an increase in revenues. Based on an average cost of an upgrade kit of EUR 150,000 per aircraft. We would have to generate (add 120'000 EUR times the number of helicopters you have in your fleet that need to be upgraded) e.g. 360'000 EUR more per year to earn the investment over the time given. This is simply not feasible in the current environment. The effects of Option 1 will still be applicable until the upgrade has been made, therefore doubling the impact on operators. Loss in value and significant investments without an increase in value of the asset (helicopter). One sector where many of these legacy types are utilised is in the provision of aerial firefighting, this capability will be affected massively.
3. The adoption of a retrofit requirement will lead us to sell-off into countries where there is no regulatory requirement for CRFS. Therefore, we will be exporting the problem. The risk from these legacy helicopters does not go away. It would be just transferred. It would be better to keep these aircraft within the regulatory framework of Europe where there is a high standard of maintenance and mature operating procedures where they would present less of risk due to the lower accident rate.
4. This proposed requirement will lead to different standards compared to the United States. This in turn creates an additional burden on the OEMs, whom must manage the requirements of several jurisdictions. Exemptions granted in one jurisdiction cannot be applied in another jurisdiction. This leads to a potential loss of legal certainty and investments already taken to upgrade existing fuel tank systems may have to be re-evaluated and written off. Also, it is not yet clear if the supply chain will be able to produce and install the required number of upgrade kits to their fleet within the times allocated in the NPA. Indeed, some aircraft types are never likely to see retrofit kits designed for them due to negative business cases or technical restrictions.

(ROBERT FUCHS AG / FUCHS HELIKOPTER) would like to point out that the economic impact analysis of this regulation is misleading and does not capture the full effect on the balance sheet, running cost and potential value of the helicopter and companies, as a whole. We strongly urge the regulator to take a more holistic approach regarding economic impact and take all financial aspects into consideration. An incomplete economic analysis might lead to wrong decisions that could have a massively negative effect on European operators, especially small to medium-sized companies.

(ROBERT FUCHS AG / FUCHS HELIKOPTER) also would like to point out that every euro invested in additional safety features needs to be earned first. In the current economic environment with rising interest rates, rising costs for fixed as well as variable costs items, the pressure on operators is ever increasing. When drafting regulations, the regulator also must take into consideration the market situation and the market potential for



generating the required revenues that will cover these additional costs. The regulator cannot ignore these economic realities.

(ROBERT FUCHS AG / FUCHS HELIKOPTER) does not dismiss the need for improving safety. However, (ROBERT FUCHS AG / FUCHS HELIKOPTER) considers there must be a balance between increased safety and economic feasibility. In conjunction with massive administrative burden, it is increasingly hard for small operators to serve their communities and provide essential services to Europe and the people that live within its borders. This cannot be in the interest of the regulator and European Community.

As a general principle, (ROBERT FUCHS AG / FUCHS HELIKOPTER) would like to see financial support made available to operators to encourage rapid installation of available technologies where economic imperatives may otherwise prohibit adoption. Closer alignment between the European Plan for Aviation Safety, Member States' Safety Plans and funding programmes such as Horizon Europe provide an ideal opportunity to maximise the impact of the adoption of EASA derived safety initiatives, such as CRFS in smaller aircraft.

Requested texts of regulation 26.440:
26.440 Fuel system crash resistance

(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after [1 year after the date of entry into force] shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

~~(b) Operators of small helicopters and large helicopters that are designed for five or more occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.~~

~~(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.~~

Requested addition to text (bold font and underlined) of certification specification CS 26.440:

CS 26.440 Fuel system crash resistance

(b) Self-sealing breakaway fuel line couplings must be installed unless hazardous relative motion of fuel system components to each other or to local rotorcraft structure is demonstrated to be extremely improbable or unless other means are provided. The couplings or equivalent devices must be installed at all fuel tank-to-fuel line connections, tank-to-tank interconnects, and at other points in the fuel system where local structural deformation could lead to release of fuel.

(1) The design and construction of self-sealing breakaway fuel line couplings must incorporate the following design features:

(i) The load necessary to separate a breakaway coupling must be between 25 % and 50 % of the minimum ultimate failure load (ultimate strength) of the weakest component in the fluid-carrying line. The separation load must in no case be less than 1334 N (300 lb), regardless of the size of the fluid line. A breakaway load less than 1334 N within the 25% to 50% range may be used if the installation includes features preventing a load larger than the breakaway load from being applied to the coupling inadvertently.

Best
Robert Stokmaier

Regards



response

Not accepted

See the response to comment #20.



comment	40	comment by: LBA
	<p><u>LBA comment:</u></p>	
	<p>How do you determine the number of fatalities which are mentioned in the paragraphs related the “safety impacts”?</p>	
response	<p>Noted.</p> <p>The safety risk assessment in Section 4.1.1 estimated the potential reduction in fatalities for CS-27 and CS-29 helicopters in the fleet of EASA Member States during the 2009-2018 period.</p> <p>Using the resulting annual accident rate per helicopter type, and the estimated number of compliant and non-compliant helicopters for each option in each year, the number of accidents and fatalities that could have been prevented was estimated for each year in the 2020-2054 period.</p> <p>The safety impact of each option, measured by the number of prevented fatalities, is expected to increase proportionally with the share of compliant helicopters in the fleet resulting from that option.</p>	
comment	41	comment by: LBA
	<p><u>LBA comment; Page 25; Option 1:</u></p>	
	<p>In general it is hard to follow and verify the calculations presented in this section. One example: Calculation of „Economic Impact“ in section 4.5.2.: How do the values of non-recurring design costs (1.6 million), production unit costs (19.7 million) and additional operating costs (31.2 million) add up to 46.3 million???</p> <p>How does the number of 46.3 million match with the later mentioned number of 52.5 million?</p>	
response	<p>Accepted</p> <p>The €46.3 million value in Section 4.5.2 is an error. The correct sum, as later mentioned, is €52.5 million.</p>	
comment	60	comment by: Arctic Air AB
	<p>We would like to insist on this option, option 1, being selected. Any other option would have a severe impact on our company, as well as many other small to medium-sized operators. As for us almost 80% of our fleet (B206 and MD500) would drop severely in value immediately. There are no retrofit kits available for our helicopters and are likely never to be developed either. These helicopters will be replaced within reasonable time, due to customers demand and other technical requirements. But to put this kind of regulation on us in one blow would be devastating.</p>	
response	<p>Noted</p> <p>EASA acknowledges that the economic impact could be significant and is currently discussing mitigation measures. It is anticipated that TC or STC holders will propose</p>	

retrofit solutions for in-service rotorcraft. The compliance demonstration against CS27/29 952 has also been adjusted to optimise certification costs.

comment	104	comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	<u>Rationale</u>	
	In relation to the following sentence in p.25: <i>"there are 12 other types [...] already have a design solution available [...] therefore, have no development costs."</i>	
	This assumption is true for design, development and US certification costs, but the costs associated to the EASA Validation activities (e.g. OEMs engineering hours, application fees, etc.) for those types that are not yet EASA-validated shall be included. This assumption is also true only if the same partial compliance to CRFS requirements will be accepted/endorsed by EASA.	
	<u>Proposed text/action</u>	
	Include estimates for non-recurring EASA-validation costs for CRFS solutions that are only FAA certified.	
response	Noted	
	It is indeed true that validation costs must be taken into consideration. The proposed partial compliance with CRFS will fit as much as possible with the US-approved products.	

4.5.3. Option 2 - Option 1 plus: as of 2030, retroactive CRFS requirements for existing EU-registered rotorcraft that were type-certified in or after 1978

p. 26

comment	7	comment by: <i>CAA-Norway TFH</i>
	CAA-Norway supports this option for helicopters operated as CAT - Commercial Air Transport - as passengers buying tickets/flights have expectations of a reasonable level of safety. Today's cars provide a level of protection of safety which is orders of magnitude greater than current helicopters.	
response	Noted	
	It has been found difficult to link the applicability with the operational aspects.	

4.5.5. Option 4 - As of 2030, retroactive application of CFRS requirements to the existing fleet of rotorcraft with five or more seats

p. 31

comment	42	comment by: <i>LBA</i>
	<u>LBA comment; Option 4:</u>	



response	The first sentence seems to be wrong because in this option 4 the helicopters which are out of production and which have less than five seats have no obligation to include any CRFS.
response	Accepted
comment	106 comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	<u>Rationale</u>
	EASA states in p. 31 – Option 4: “[...] <i>with five or more seats</i> ”. There is an inconsistency in the NPA with the terminology “seats’ vs. “occupants” for Option 4 and 5.
	<u>Proposed text/action</u>
	EASA should clarify the use of the term ‘seats’ vs ‘occupants and ensure the use of the following terminology through the NPA/Opinion: "designed for X number of occupants ". Furthermore, it is encouraged that EASA establishes the WG in CRT Comment 81 to review the provided options again.
response	Accepted

4.5.6. Option 5 - As of 2038, retroactive application of CFRS requirements to the whole existing EU rotorcraft fleet

p. 32

comment	105 comment by: <i>General Aviation Manufacturers Association (GAMA)</i>
	<u>Rationale</u>
	In relation to the following sentence:
	<i>"[...] several high-profile litigation cases in the US, which have resulted in significant settlement costs (USD 100 million) for rotorcraft operators [...]"</i>
	The link from footnote 22 does not clarify which portion of the 100 million value is on the operator side, therefore the sentence should be at least modified accordingly. In general, litigations and legal proceedings are strictly linked to local legislation frameworks, which usually have significant differences from each other, also in approaching accidents/incidents responsibilities and potential settlement costs.
	The resulting effects from litigation cases in US may be completely irrelevant for the EU. Therefore, it seems pretentious to include this reference in this NPA.
	<u>Proposed text/action</u>
	EASA to remove the sentences on US litigation cases. Alternatively, EASA should completely re-write the sentence indicating which portion of the USD 100 million falls on the operator side.



response	Noted Both the manufacturer and the operator had to pay compensation but details were not provided.
comment	115 comment by: <i>British Helicopter Association</i> This adoption of the Option 5 would be the best compromise which allows the maximum period for operators to amortise the cost of a retrofit or fleet replacement. By combining it with Option 4 this will severely affect certain parts of the industry and local communities. 2030 is probably not achievable in kit availability and embodiment terms
response	Noted. EASA acknowledges that the economic impact could be substantial. Mitigation measures are currently being discussed.

4.6.1. Comparison of the options

p. 34

comment	43 comment by: <i>LBA</i> <u>LBA comment:</u> Please, can you explain why the values in figure 4 are different to the values mentioned in section 4.5.1 through 4.5.6?
response	Accepted Figure 4 on page 34 has some errors in the benefit figures. The benefit of forward fit is not €12 but €13 million, the benefit of retrofit for Options 3, 4 and 5 are not €16, €15 and €3 million but €18, €16 and €4 million.
comment	44 comment by: <i>LBA</i> <u>LBA comment; figure 5:</u> Please can you explain why option 1 and option 2 seems to have an almost similar path and why option 1 have not a step in 2025? How would be the path of the final solution (3 steps) of this NPA?
response	Noted There is a small difference between Options 1 and 2 in 2030. This difference becomes negligible within a few years. Option 2 would mean a relatively low number of additional CRFS-compliant helicopters in the fleet and those additional helicopters would then relatively quickly retire.



Option 1 has no sudden increase in the share of compliant helicopters because it affects only new deliveries, and new deliveries enter the fleet only gradually. (In any given year, the share of new deliveries is relatively low.)



comment	67	comment by: FAA
	Page Paragraph	Number: 35 5
	Referenced Text: Percentage of aircraft meeting CRFS requirements for "option 1" is not showing well on the Figure 5, perhaps it is in line with "option 2" but it is hard to tell.	
	Comment/Rationale or Question: Compliance results of Option 1 is not showing well in the analysis.	
	Proposed Resolution: An expansion of Figure 3 (option 0) to other options, or to present data in a table would show the CRFS compliance more clearly.	
	Comment Type: Editorial	
response	Noted	
	Option 1 is hidden behind the purple line.	
	A table with the data can be provided but the plot, providing a visual representation, can better explain the different options.	

4.6. Conclusion

p. 34

comment	45	comment by: LBA
	<u>LBA comment; Page 37 and 38:</u>	
	There is a change in the paper format between page 37 and 38 and not only portrait to landscape format.	
	<u>LBA comment; Page 38:</u>	
	LBA concurs that option 1 (= forward fit solution) would be an acceptable solution For the other options, the discrepancy between cost and benefit seems too high and cannot be dissolved by the referenced uncertainties in the assumptions and additional aspects of consideration (cost of litigation or liability claims).	
	For the existing fleet we strongly recommend a differentiated approach based on the actual service experience for the individual type of rotorcraft. To accomplish this differentiated approach for the existing fleet we see two possibilities: 1) exclusion of certain models considered to be not affected, as already practiced in CS 26 Appendix 1 for other requirements (see comment above referring to section 2.1). 2) or, in our opinion the even better option, to apply these requirements in the usual way by Airworthiness Directives as far as justified by proven negative service experience.	
response	Noted	
	The negative in-service experience documented as regards certain models has already been taken into account in the recommendations. The absence of post-crash fire data	



and incidents for certain models does not imply that the rotorcraft does not require CRFS implementation. EASA considers that all models designed without CRFS protection should be equally susceptible to post-crash fires.

comment 107 comment by: *General Aviation Manufacturers Association (GAMA)*

Rationale

In relation to the following statement:

"[...] the following additional factors should be considered: [...] if no action is taken in Europe, there would be a difference with the FAA [...] safety level between the US and the European Union"

This is not an "additional factor" to be considered. It is indeed part of the "why" section of NPA 2022-10 (ref. page 6), therefore should not be listed in this paragraph as an additional factor.

Proposed text/action

Remove the repetition of regulatory difference between US and EU in the "additional factors" paragraph.

response Not accepted

It is an additional factor to the cost-benefit analysis. It is correct to mention it there.

comment 108 comment by: *General Aviation Manufacturers Association (GAMA)*

Rationale

The sustainability of the supply chain should be an additional factor/consideration for a pragmatic approach to this issue. There are only few suppliers that can produce spares of fuel tanks with the rate that would be required by the proposed Options. In particular, the production process of this type of product is often still based on manual skills. Before reaching the steady-state production rate, the production of new fuel tanks for products that are currently non-CRFS will require a relevant ramp-up phase, which usually lasts a couple of years. The resulting scenario from the contemporary application of CRFS solution to all the EU existing fleet while also supporting the new built needs is more than optimistic. Therefore, for Options 2, 3, 4 and 5, the industry believes the timescale provided is too optimistic.

Proposed text/action

EASA is requested to:

a) note GAMA/ASD's CRT comment No. 85 proposing an extension of the NPA's timelines due to industrial capacity constraints.



	<p>b) include in this NPA the evaluation of a) expected EU production volumes for newly builds; and b) production needs to retrofit the entire EU fleet.</p> <p>c) carry out an in-depth analysis of forecast scenarios. Notably a more refined model for 2025-2050 fleet evolution, taking also into account production volumes forecasts as well as production and supply chain capacity/constraints potential evolution over time.</p> <p>d) EASA is also encouraged to set up a working group together with industry tasked to investigate quantitative data that supports an appropriate analysis for this NPA, in line with GAMA/ASD's CRT Comment No 81.</p>
response	<p>Noted</p> <p>Based on the comments received, EASA is working on mitigation measures including adaptation of the proposed timelines. A workshop will also be organised to collect feedback and present the final text for the Opinion.</p>
comment	<p>110 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Rationale</u></p> <p>In relation to:</p> <ul style="list-style-type: none"> • the sentence in p.23: <i>"the costs [...] provided by Industry to the ARAC ROPWG are considered excessive and very pessimistic."</i> This consideration is not acceptable to the industry • <i>the sentence in p.38: "The costs were taken from ARAC ROPWG report and are considered: - to be significantly inflated [...]"</i> • the sentence in p.38: <i>"However, the non-monetized considerations and the need to improve the safety of the existing fleet call for a pragmatic approach to the retrospective application of the CRFS requirements."</i> <p>It is important to point out that EASA, in this NPA, initially considered the ARAC ROPWG as a trustable source to gather significant estimates and perform the CBA. The Agency then proceeded to carry out the CBA with the ARAC ROPWG data using 'rudimental extrapolations' and additional assumptions. Ultimately, upon EASA's realization that the CBA results did not align with the regulatory intent of this NPA, the Agency classifies the ARAC ROPWG data as <i>excessive, very pessimistic, and significantly inflated</i>. Regrettably, this approach is not acceptable to industry.</p>

The sentences above and the approach taken by EASA in this NPA seems to imply the Agency does not rely on the CBA results, which sets a dangerous precedent of proposing regulatory amendments without transparent and data-driven evaluations and conclusions. The agency seems to impose its own approach in total disregard of logical conclusions from available data sources. It should also be noted that EASA unilaterally decided to follow both methods and outcomes of ARAC ROPWG reports without proposing a new WG for this RMT/Subtask. If contents of the ARAC ROPWG reports are not aligned with EASA expectations, further research should be performed through the proper form of a dedicated WG tasked to gather new/updated/refined input data from the stakeholders for an effective EASA CBA.

Proposed text/action

EASA is requested to:

- provide supporting evidence from which it can be inferred that costs provided by Industry to ARAC ROPWG were "*excessive and very pessimistic*" as well as '*significantly inflated*'.
- If no supporting evidence is provided to justify those statements, remove the cited sentences from any official EASA document and consider the cost estimates provided by industry to the ARAC ROPWG as the best available data. This data is provided by industry organisations which sustain these costs and have actual experience in the definition of such estimates.
- If no supporting evidence is provided to justify those statements and ARAC ROPWG estimates are still considered "*excessive and very pessimistic*" as well as '*significantly inflated*', EASA is encouraged to set up a working group together with industry tasked to investigate quantitative data that supports an appropriate analysis for this NPA, in line with GAMA/ASD's CRT Comment 81.
- EASA should consider the possibility of applying the impracticability concept in this scenario. Cost-benefit vs safety effect, rather than taking the approach described above. If CBA results indicate negative results when studying certain regulatory amendments, EASA should acknowledge the impracticability of the regulatory option and seek alternative actions.

response Not accepted

The CBA is only one part of the process.



The same conclusion has been made by EASA on the CBA, however the results of the cost benefit/ cost effectiveness do not provide the full picture of the effectiveness of the different options, and additional factors have to be considered.

No action will continue to expose fleet to post-crash fire events.

The safety recommendations and ADs should also be considered to take into account in-service experience.

The rotorcraft that are not compliant with CRFS requirements could potentially expose the operator and the applicant to litigation measures.

The detrimental effect of the post-crash fire event on the public is unjustifiable.

Those aspects have been further developed in the NPA.

Regarding working groups, workshops will be organised to collect feedback and present the final text for the Opinion.

comment 111 comment by: *General Aviation Manufacturers Association (GAMA)*

In relation to this sentence:

“The costs that are provided in the ARAC ROPWG report are for full compliance only, and the costs could be considerably lower for partial compliance.”

Development costs (as non-recurring) associated to full or partial compliance may be different, while for recurring cost will be the same so the estimation provided may be conservative but are not so far from reality.

Proposed text/action

EASA to review the sentence. At minimum, remove the word "considerably" as proposed:

“the costs that are provided in the ARAC ROPWG report are for full compliance only, and the costs could be ~~considerably~~ lower for partial compliance”

response Accepted

The EASA experience with fuel tank drop tests reveals that tests involving the surrounding structure are significantly more complex and yield uncertain results compared to tests conducted with the bladder only. The proposed test configuration in the NPA will reduce the costs.

comment 112 comment by: *General Aviation Manufacturers Association (GAMA)*

Rationale

In relation to the following statements:



	<p>Page 37: <i>"However, the uncertainties related to the estimation of the potential benefits should be again highlighted"</i></p> <p>Page 38: <i>"some uncertainty in the number of preventable fatalities [...]; the actual benefits in terms of preventable fatalities could be higher"</i></p> <p>Since benefits uncertainties are high, the preventable fatalities could be both significantly higher or significantly lower than estimated, with the same likelihood. highlighting only that actual benefits could be higher could be misleading for the reader.</p> <p><u>Proposed text/action</u></p> <p>EASA to include uncertainty quantification and sensitivity analysis in the NPA as proposed in CRT Comment 90. EASA to also remove misleading suggestions on which "direction" could uncertainty contribute to (same likelihood of increasing or decreasing estimates).</p>
response	<p>Not accepted</p> <p>The number of preventable fatalities could be either higher or lower. The ranges in Table 4 on page 18 are meant to illustrate this.</p> <p>The cost-benefit analysis was carried out with the highest estimate for the potential number of fatalities prevented. The net present value would be an even lower negative figure if the lower benefit estimates were used.</p>
comment	<p>113 comment by: <i>General Aviation Manufacturers Association (GAMA)</i></p> <p><u>Rationale</u></p> <p>In relation to this statement in p.38:</p> <p><i>"The costs were taken from ARAC ROPWG report and are considered: - to be significantly inflated; a single OEM indicated that the actual unit cost could be 50-60% lower for their rotorcraft types"</i></p> <p>One single OEM might have indicated that actual unit cost could be lower, but another OEM (if asked) may also indicate that actual unit costs (or non-recurring costs) could be correct, or higher, or maybe lower but with a different % with respect to the one indicated by the first OEM.</p> <p><u>Proposed text/action</u></p> <p>EASA should remove the mentioned sentence in p.38:</p> <p><i>"ARAC ROPWG report and are considered: - to be significantly inflated; a single OEM indicated that the actual unit cost could be 50-60% lower for their rotorcraft types."</i></p> <p>GAMA/ASD encourages EASA to compose a WG to review quantitative data specific to the EU fleet that sustains a different and appropriate regulatory, in line with CRT Comment No. 81.</p>

response

Accepted

Regarding the working group proposal, EASA will organise two workshops to collect feedback and present the final text for the Opinion.

