

Crash Resistance Fuel Tank (CRFS)

Presentation by:

Laurent PINSARD
Chief Airframe Expert

Rotorcraft Structures Workshop
18-19 February 2025

Your safety is our mission.

Disclaimer

The content of this presentation is for information purposes only. All information provided is of a general nature only and is not intended to address the circumstances of any particular project, individual or entity. Any time there is a conflict or discrepancy between the information provided in this presentation and information in an official regulation or EASA document, the latter prevails.

Despite every effort to ensure the accuracy of the information provided, it may contain occasional inadvertent inaccuracies or typographical errors. Any error brought to our attention (vtol@easa.europa.eu) will be promptly corrected. In no event shall EASA be liable for any incidental or consequential damages, even if EASA has been informed of the possibility thereof.

The content may be subject to changes at any time without prior notice. To the maximum extent permitted by law, EASA is not liable (whether in contract, negligence or otherwise) for any loss or damage arising from the use of these materials. The information contained in this presentation should not be construed as legal advice.

All presentation material and other information provided by or on behalf of EASA are furnished on an "as-is" basis, without warranty of any kind, whether express, implied, statutory or otherwise especially as to its quality, reliability, currency, accuracy or fitness for purpose.

Ownership of all copyright and other intellectual property rights contained within the EASA presentation material, including any documentation, data, technical information and know-how provided as part of the presentation, remain vested in EASA. Reproduction is authorised, provided the source is acknowledged, except where otherwise stated. All logos, copyrights, trademarks and registered trademarks in these presentations are the property of their respective owners.

easa.europa.eu/connect

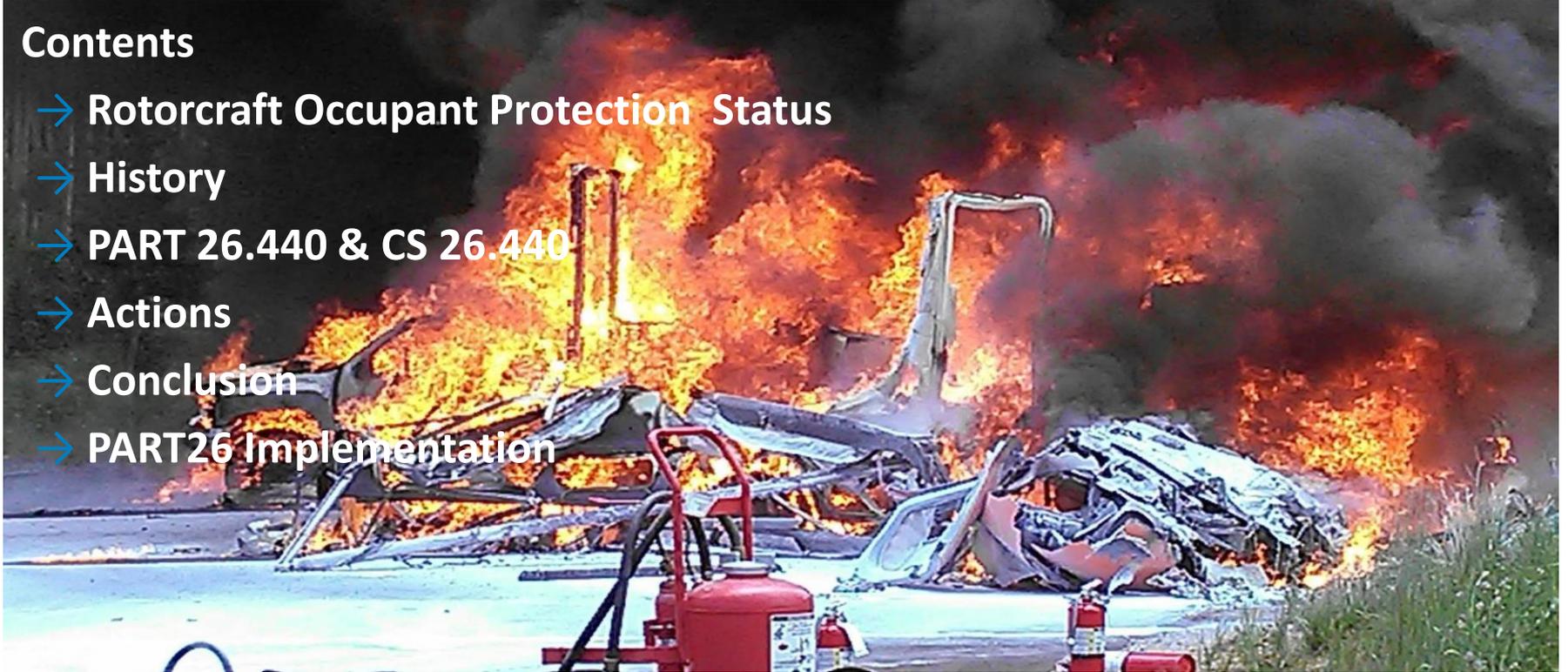


Your safety is our mission.

Crash Resistant Fuel System (CRFS)

Contents

- Rotorcraft Occupant Protection Status
- History
- PART 26.440 & CS 26.440
- Actions
- Conclusion
- PART26 Implementation



Rotorcraft Occupant Protection Status

Certification Specifications for Small Rotorcraft (CS-27) and Large Rotorcraft (CS-29) contain specifications related to Crash Resistant seat and structure (CRSS) & crash-resistant fuel systems (CRFS) for helicopters.

HOWEVER

Part of the **in-service & newly manufactured** helicopters not compliant with a CRFS & CRSS requirement

CRSS & CRFS – History – ARAC ROPWG

2015. ARAC Rotorcraft Occupant Protection (ROPWG):

Emergency landing conditions and fuel system crash resistance

2018. Final Report (CRFS and Crash Resistance Seat & Structures)

CRFS

ROPWG Recommendation:
Require retrofit of crash resistant
fuel bladders in all operational
helicopters with few exceptions.
(Limited structural impact).

CRSS

ROPWG did not recommend
implementation.
overwhelmingly **impracticable** or
implementation would lead to **little
or no benefit.**



2017-2018. FAA. *The H.R.3150 - 115th Congress ()*

*Helicopter Fuel System Safety Act | Congress.gov | Library of Congress was introduced into the House on June 29, 2017. This bill prohibits a person from operating **a newly manufactured helicopter in US airspace unless the FAA certifies that the helicopter's design complies with certain CRFS requirements.** All helicopters manufactured after April 5th, 2020 and operated in the USA are required to have crash-resistant fuel tanks.*

ARAC, TOR (FAA-EASA-Industries)

https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3722

Rotorcraft Occupant Protection (27/29.561)

- Crash Resistant Fuel System (CRFS)
- Crash Resistant Seat and Structure (CRSS)

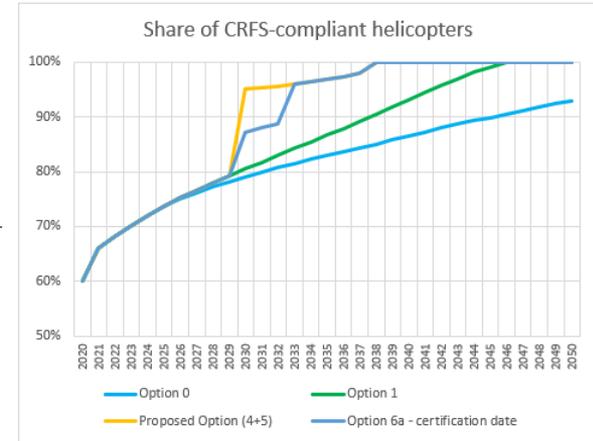
PIA (EASA)

Rulemaking Activities with ARAC
Recommendation

EASA NPA 2022-10 Improvement in the survivability of rotorcraft occupants in the event of a crash

2022 EASA NPA 2022-10. *Mitigate the risks linked to a post-crash fire involving a rotorcraft, thus improving rotorcraft occupant survivability in the event of a crash.*

This can be achieved by increasing the number of rotorcraft that operate in the European Union with a CRFS installed, thereby reducing the likelihood of a post-crash fire.



Conclusion. It is proportionate and cost-efficient to render some of the CRFS requirement applicable to “some” in-service helicopters operated in the Union and to those that will be produced after the entry into force of this Regulation

History - Accident Investigation & Safety Recommendations

Accident Investigation & Safety Recommendations

It appears to be an obvious paradox that helicopters produced recently, do not comply with safety specifications dating back to 1994. This represents a risk in all cases in which a fire develops following an accident with a helicopter produced after 1994 but with a certification basis prior to 1974:

*...the fire developed immediately after impact with the ground but, initially, it did not break out suddenly, **allowing the occupants to evacuate** ...*

EASA's safety action on NPA 2022-10 aimed at decreasing the risk of fire following an accident seems appropriate.

*Therefore, pending the outcome of the NPA, it seems appropriate that **the requirement to adopt a CFRS should also be made mandatory for newly manufactured helicopters operated in European member states.***

History - Accident Investigation & Safety Recommendations



CRFS – PART 26.440 – IMPACTED ROTORCRAFT

Operators of small helicopters and large helicopters shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system when:

(a) the helicopter type certificate was issued on or **after 2 October 1994**, and:

- (1) the helicopter **first individual certificate of airworthiness (registration)** is issued on or after **22 December 2026**, or
- (2) the helicopter first individual certificate of airworthiness is issued before 22 December 2026, and:
 - (i) if any individual certificate of airworthiness is issued by a Member State on or after 22 December 2024 after an **import** of the helicopter from a non-Member State, or
 - (ii) if:
 - A. the helicopter has been designed for six or more occupants, and is operated on or after 22 December 2031; or
 - B. the helicopter has been designed for five or less occupants, and is operated on or after 22 December 2039.

CRFS – PART 26.440 – IMPACTED ROTOCRAFT

(b) the helicopter type certificate was issued **before 2 October 1994**, and:

- (1) the helicopter first individual certificate of airworthiness (registration) is issued on or after **22 December 2026** or,
- (2) the helicopter first individual certificate of airworthiness (registration) is issued before 22 December 2026 and if any individual certificate of airworthiness is issued by a Member State on or after 22 December 2024 after an import of the helicopter from a non-member

CRFS – PART 26.440 - SUMMARY

- the helicopter **first individual certificate** of airworthiness is issued on or after **22 December 2026** or
- the helicopter has been designed for
 - **six or more occupants**, and is operated on or after **22 December 2031**; or
 - **five or less occupants**, and is operated on or after **22 December 2039**.
- first individual certificate of airworthiness is issued before 22 December 2026 and if any individual certificate of airworthiness is issued by a Member State on or after **22 December 2024** after an import of the helicopter from a non-member
- **Newly manufactured**
- **In service**
- **Imported**

CRFS – PART & CS26.440

PART 26.440 (a)(1) & (b)(1) Newly manufactured

APPLICABILITY: TC issued before (b)(1) and after 1994 (a)(1)

EFFECTIVITY DATE: **22 December 2026**

CS 26.440 (a) (see FAA US law 49 U.S.C. § 44737 (2018) established by the FAA Reauthorization Act of 2018 (H.R. 302, Pub.L. 115-254), Section 317, HELICOPTER FUEL SYSTEM SAFETY)



CS26.440	(a)	(a)(1)(i)	(a)(1)(ii)	(a)(1)(iii)	(a)(1)(iv)	(a)(2)	(a)(2)(i)	(a)(2)(ii)	(a)(2)(iii)	(a)(3)	(a)(4)	(a)(5)	(a)(6)
CS.XXX equivalent	29.952(a)(6)	29.952 (a)(1)	29.952 (a)(2)	29.952 (a)(3)	29.952 (a)(5)	29.952 (c)	29.952 (c)(1)	29.952 (c)(2)	29.952 (c)(3)	29.952 (f)	29.952 (g)	29.963 (b)	29.975(a)(7)
Remark	Fuel tank drop test												370lbs or 250lbs (surrounding structures)

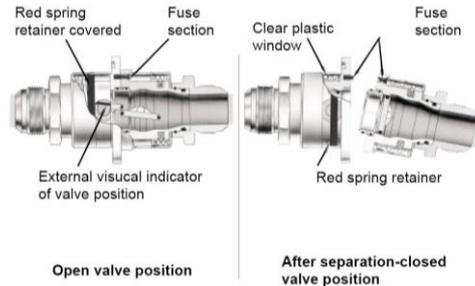
CRFS – newly manufactured

Applicability:

- Rotorcraft in production

Implementation:

- 1 Year → 2 Years



Fuse breakaway & Rollover vent valves
26.440(a)

Consistent with FAA



Bladder with/without surrounding structure.
26.440 (a)

ETSO-C80
Appendix 1

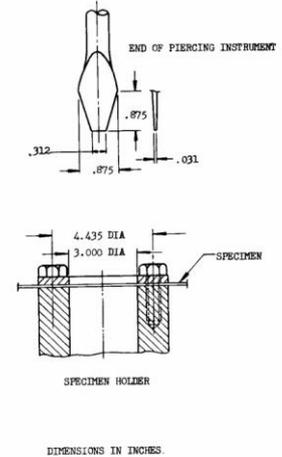


FIGURE 2. Piercing instrument and specimen holder

Puncture test 370 Lbs or 250Lbs
if successfully drop tested in
structures 26.440 (a)

CRFS – PART & CS26.440

PART 26.440 (a)(2)(i) & (b)(2) - Imported

APPLICABILITY: Individual certificate of airworthiness is issued by a Member State on or after 22 December 2024 after an import of the helicopter from a non-Member State.

EFFECTIVITY DATE: 22 December 2024



CS26.440	(b)	(b)(1)(i)	(b)(1)(ii)	(b)(1)(iii)	(b)(1)(iv)	(b)(2)	(b)(3)
Equivalent CS	29.952(a)(6)	29.952 (a)(1)	29.952 (a)(2)	29.952 (a)(3)	29.952 (a)(5)	29.952 (f)	29.963 (b)*
	Fuel tank drop test						250 Lbs

CRFS – PART & CS26.440

PART 26.440 (a)(2)(ii)(A)&(B) – In service

APPLICABILITY: TC issued after 1994 (a)(2)(ii) (A) &(B))

EFFECTIVITY DATE: 22 December 2031 (≥ 6 Occupants) or
22 December 2039 (< 6 Occupants)

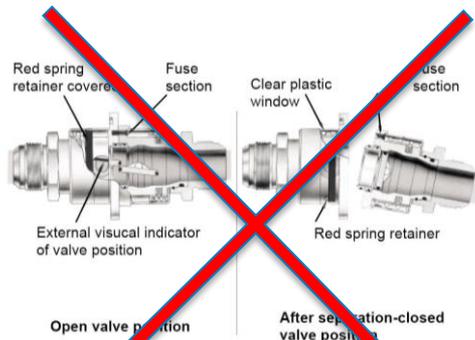


CS26.440	(b)	(b)(1)(i)	(b)(1)(ii)	(b)(1)(iii)	(b)(1)(iv)	(b)(2)	(b)(3)
Equivalent CS	29.952(a)(6)	29.952 (a)(1)	29.952 (a)(2)	29.952 (a)(3)	29.952 (a)(5)	29.952 (f)	29.963 (b)*
	Fuel tank drop test						250 Lbs

CRFS - In service & Imported

Applicability:

- Rotorcraft in Service & Imported



Fuse breakaway & Rollover vent valves
26.440(b) not requested



Bladder without surrounding structure.
26.440 (b)

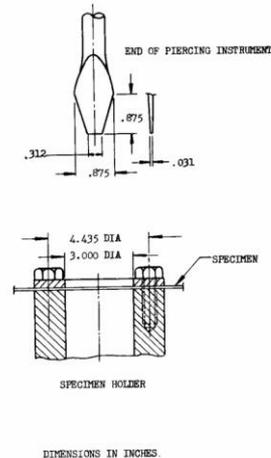
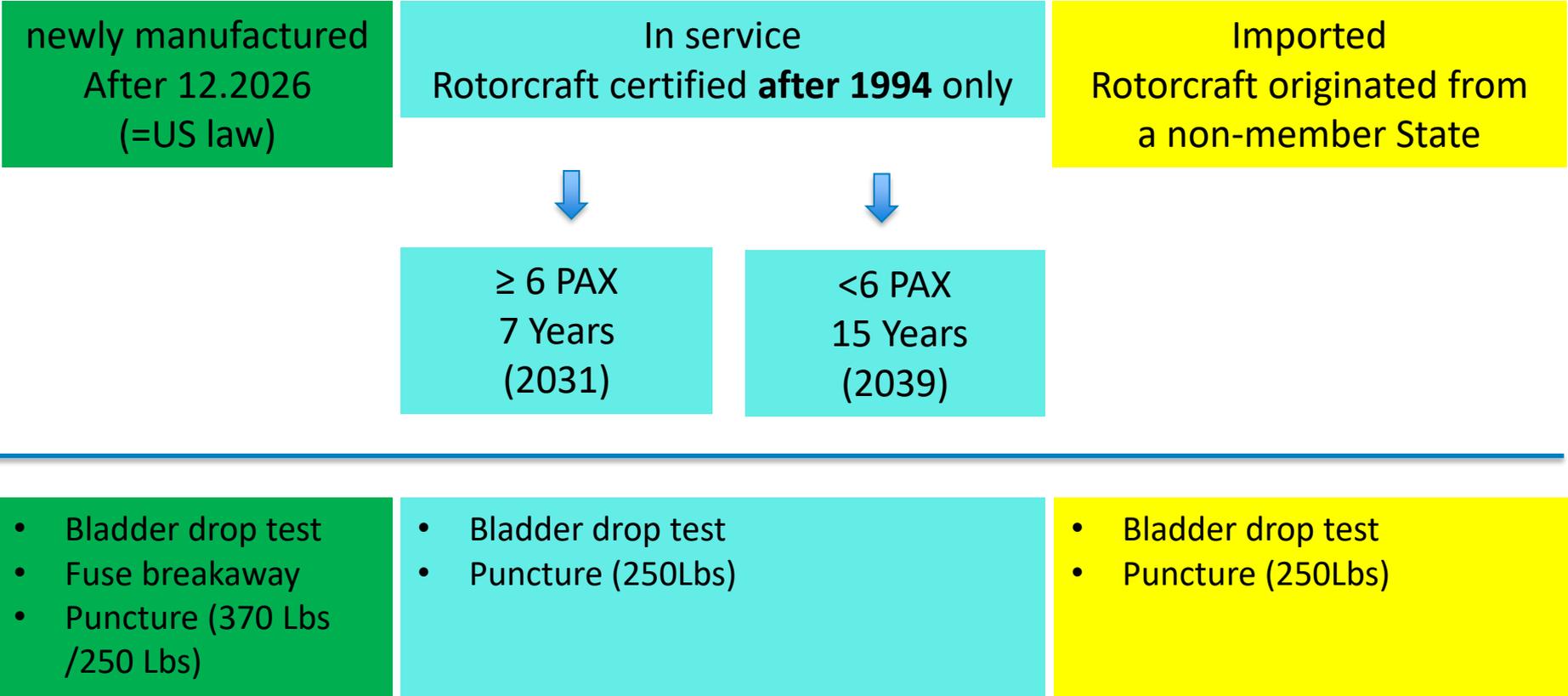


FIGURE 2. Piercing instrument and specimen holder

minimum puncture resistance
250lbs
26.440 (b)

CRFS Summary



CRFS – Conclusion

- Surrounding structures & external installation not considered in the demonstration (controversial)
- Objectives have been continuously adapted/ revised to minimise the development & Certification cost (bladder drop test only)
- Other sources of post crash fire (engine/FADEC)
- PART-26 & CS26



2015-2024



Rotorcraft Structures Workshop 18-19 February 2025

Certification Specifications
and Guidance Material
for
Additional airworthiness specifications
for operations
(CS-26)

Issue 5
2 December 2024¹



CRFS – PART 26 IMPLEMENTATION

- Contact the NAAs in charge of the registration (imported)
- Establish / confirm / complete the CRFS list (TCHs & PCMs support)
 - Rotorcraft in production
 - CRFS compliance
 - Kit or Mods available
- Communication with TCHs
- Experts Panel 3, 7 and rotorcraft PCMs
- Communication during Workshop or Forum
- Webinar NAAs, Operators
- EASA Webpage
- SIB and dedicated CM (CM–PIFS-015 Issue 01 Fuel Tank Drop Test as required by CS 27.952(a) or CS 29.952(a))
- EASA FS



Join at
slido.com
#RSW2025



easa.europa.eu/connect



Rotorcraft Structures Workshop 18-19
February 2025

Your safety is our mission.

An Agency of the European Union 

Thank you for your attention!

easa.europa.eu/connect



Rotorcraft Structures Workshop 18-19 February 2025

Your safety is our mission.

An Agency of the European Union 