

# Crash Resistance Fuel Tank (CRFS)

## Presentation by:

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**Rotorcraft Structures Workshop**  
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# Crash Resistant Fuel System (CRFS)

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# 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**.

# CRFS – History - FAA



**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](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)**

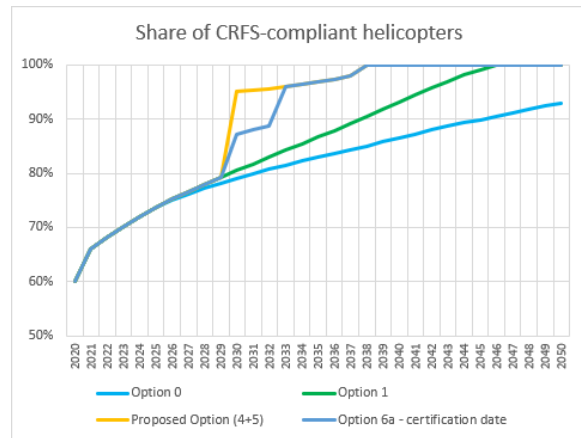
Rulemaking Activities with ARAC  
Recommendation

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
- Newly manufactured
- 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**.
- In service
- 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
- 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)

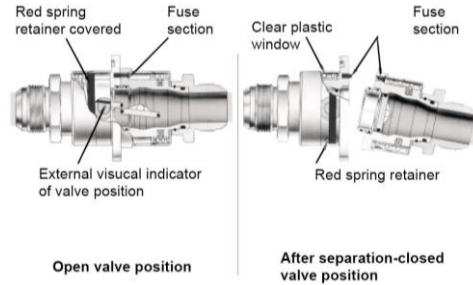
# CRFS – newly manufactured

## 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

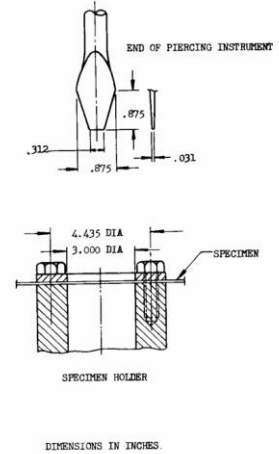


FIGURE 2. Piercing instrument and specimen holder

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)

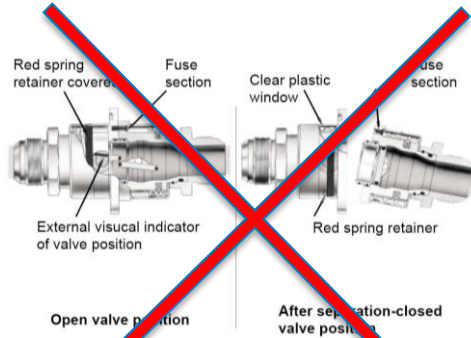


CS26.440	(b)	(b)(1)(i)	(b)(1)(ii)	(b)(1)(iii)	(b)(1)(iv)	(b)(2)	(b)(3)
Equivalent CS	29.952(a)(6)	29.952 (a)(1)	29.952 (a)(2)	29.952 (a)(3)	29.952 (a)(5)	29.952 (f)	29.963 (b)*
	Fuel tank drop test						250 Lbs

# 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)

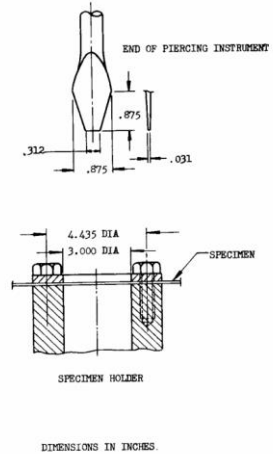
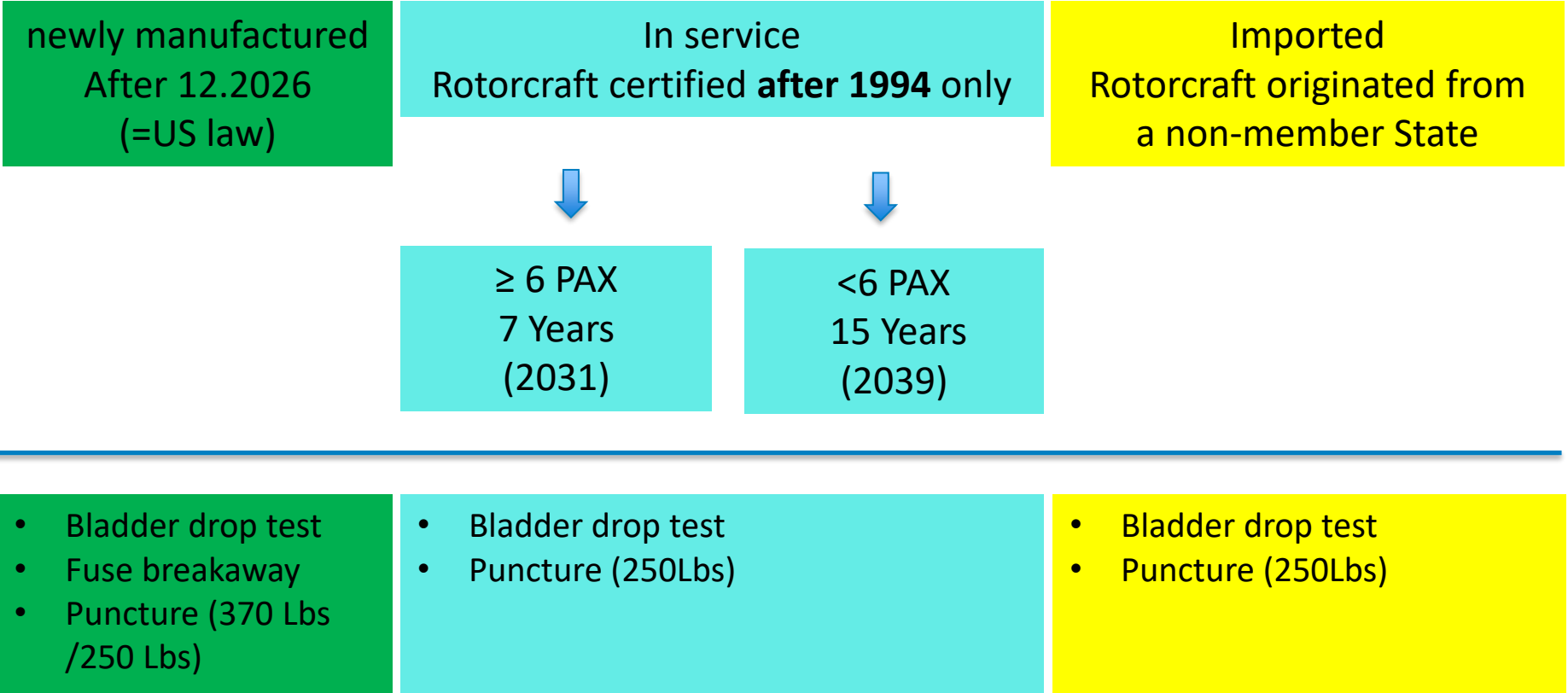


FIGURE 2. Piercing instrument and specimen holder

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**

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

Issue 5

2 December 2024<sup>1</sup>



# 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



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