EASA
European Union Aviation Safety Agency

Helicopter Ditching: Rulemaking and Research

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EASA Certification Directorate

Tenth Triennial International Aircraft Fire and Cabin Safety Research Conference

October 17-20, 2022

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Helicopter Ditching: Rulemaking & Research

- Rulemaking
  - RMT.0120 Ditching Occupant Survivability Phase I: CS 27 and CS 29 amendment
  - RMT.0120 Ditching Occupant Survivability Phase II: Part 26 and CS 26 update
  - RMT.0392 Regular update of air operations rules
  - Ditching Survival Equipment ETSOs (EBS, Life Jacket, Immersion Suit, Life rafts)

- Research
  - EASA.2019.HVP.18: Helicopter Off-Shore Operations - New Flotation Systems
  - Helicopter Underwater Escape I
  - Helicopter Underwater Escape II

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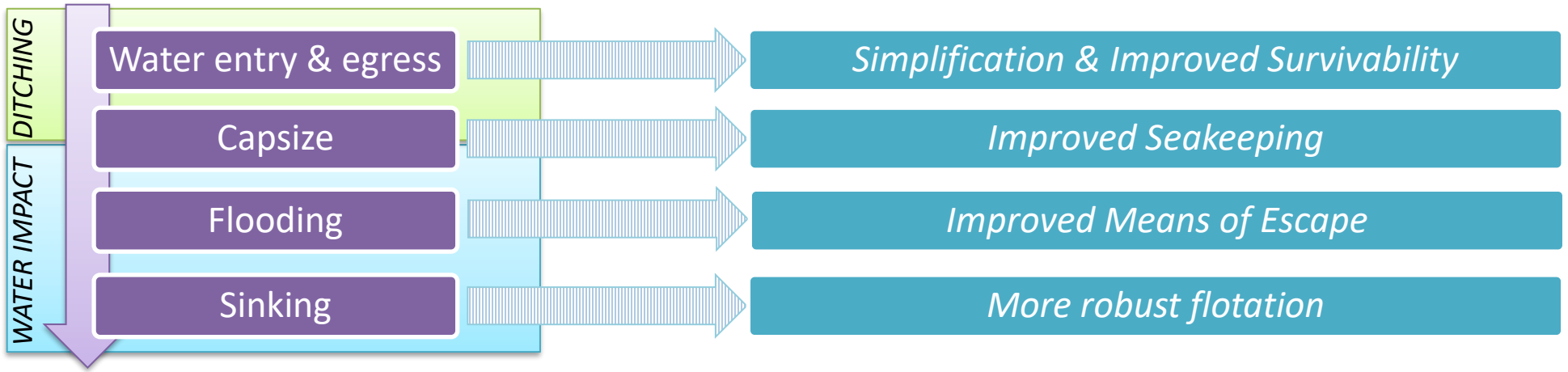
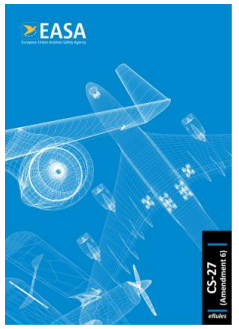
Rulemaking

RMT.0120 PHASE 1: CS-27 & CS-29 Amend. 5

- Phase 1: CS-27 and CS-29 rulemaking (NPA 2016-01)
  - Rulemaking group formed 2012
  - Focuses on survivability of occupants following ditching or water impact.
  - In otherwise survivable water impacts, fatalities have occurred due to drowning
  - Improved ditching requirements implicitly also address aspects of survivable water impacts





CS-27 **CS-29**

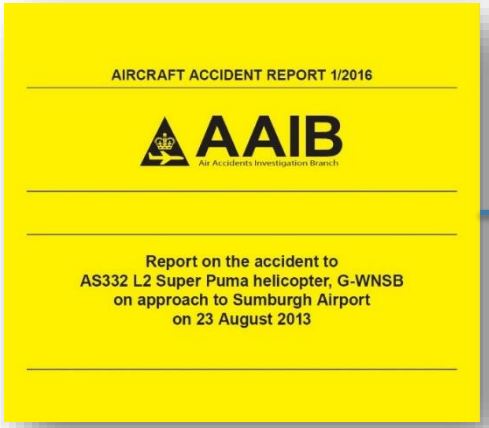
Amendment 5
14 June 2018

- New requirement §802 Emergency Flotation
- Post-capsize survivability features were not included in the CS update

RMT.0120 PHASE 2: Part 26 & CS-26 update

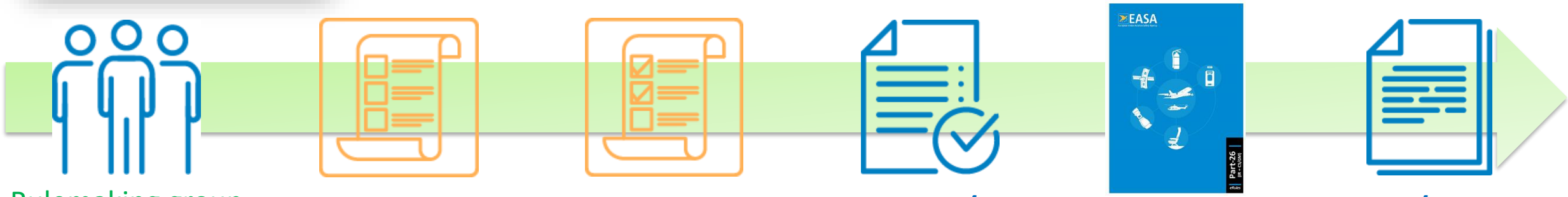
→ Phase 2: Retroactive Requirements

- → Time scale for appreciable Amdt.5 implementation in service expected to be decades
- → Justification of applicability of Amdt.5 changes to in-service aircraft investigated in Phase II



AS332 Super Puma G-WNSB Sumburgh, UK, 23 August 2013

Safety Recommendation 2016-017: "It is recommended that, where technically feasible, regulatory changes introduced by the European Aviation Safety Agency Rule Making Task RMT.120 are applied retrospectively to helicopters currently used in offshore operations."



Rulemaking group 2018

NPA 2020-16 23.12.2020

64 comments received

Opinion 01/2022 08.02.2022

Part-26 19.07.2022

CS-26 / GM-26 …

https://www.easa.europa.eu/document-library/regulations/commission-implementing-regulation-eu-20221254

Part 26 / CS 26 – “Simple” changes

26.410 Emergency controls operated underwater

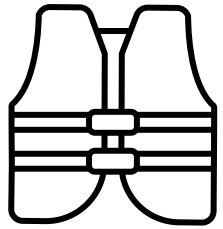
Black and yellow marking

CS 27.1555(d)(2)
CS 29.1555(d)(2)

26.420(a)(b) Flight over water emergency equipment

Life raft long line length to prevent dangerous position

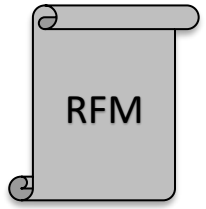
CS 27.1415(b)(2)
CS 29.1415(b)(2)



Life preserver within easy reach of each seated occupant)

CS 27.1415(c)
CS 29.1415(c)

26.425 Provision of substantiated sea conditions



Substantiated sea conditions for capsize resistance in RFM

CS 27.1587(b)(1)
CS 29.1587(c)

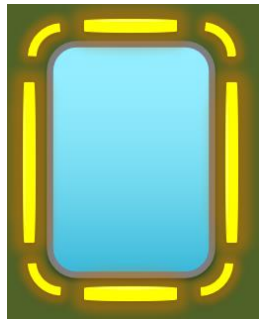
26.415 Underwater emergency exits

Black and yellow marking

CS 27.805(c), 27.807(d)(5)
CS 29.811(h)(2)

Maximum force

CS 27.805(c), CS 29.805(c)
CS 27.807(b)(2), (d)
CS 29.807(d), CS 29.809(c)



HEELS

CS 29.811(h)(1)

1 pair exits per 4 pax

CS 27.807(d)(1)
CS 29.807(d)(1)

APPLICABILITY:

9 AUGUST 2023

CS 27/29 Amdt.5 or later

Part 26 / CS 26 – “Medium” complexity

26.420(c) Life Raft Activation

→ Remotely deployable (easy reach of the flight crew, occupants of the passenger cabin and any survivors in the water), with the helicopter in an upright floating or capsized position

→ Reliably deployed in all floating attitudes including capsize and in the substantiated sea conditions

CS 29.1415(b)(1)
CS 29.1561(a),(c)

26.435(a) Auto deploy

Water immersion switches

CS 27.801(c)(2)

APPLICABILITY:

9 AUGUST 2024

CS 27/29 Amdt.5 or later

Part 26 / CS 26 – “High” complexity

26.435(b) Auto arm / always arm

Auto-arming or no restriction on EFS arming (always armed in flight)

CS 29.801(c)(2)

APPLICABILITY:

9 AUGUST 2026

26.430, 26.431 Emergency flotation system resistance to damage

- → Review of the EFS design
- → Document evaluation for discussion and agreement with EASA
- → Justification of “impracticality” of design changes not incorporated
- → Schedule of design changes for production cut-in

CS 27.801(c)(1)
CS 29.801(c)(1)

APPLICABILITY:

9 AUGUST 2025

CS 27/29 Amdt.5 or later

RMT.0120 Phase 2 Summary

- Compliance can be demonstrated to the referenced CS-27 or CS-29 Amdt.5 requirement or to CS-26 text
- Timeframe for applicability of “Simple” changes is short (9 August 2023)
- “High” complexity requirements require multiple panel involvement. TC and STC holders should not delay necessary technical activities and discussion with authority
- Encourage current “overwater” projects to “Elect-to-comply” with the relevant Amdt. 5 requirements

RMT.0392 Air Operations Regular Update

RMT.0120

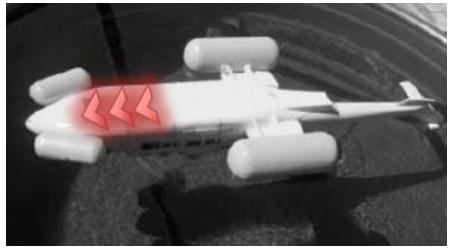
A consistency review of the cabin safety elements in SPA.HOFO in relation to RMT.0120

RMT.0392

Survival Suits and Emergency Breathing System (EBS)

ELT

Underwater escape: may not require exceptional effort



Easy to identify visually in case of capsize

AIR OPS

Ditching Survival Equipment ETSOs

RMT.0120
NPA 2016-01

Recommended review of the helicopter ditching survival equipment ETSOs

Immersion suit, life jacket and EBS

- Self-righting suit (integrated or combined with life jacket)
- Better habitability possibilities by including different insulation levels
- Development of Emergency Breathing System (EBS) ETSO

Life rafts

- Improved puncture resistance
- Compatible with remote activation design
- Provisions for 2 retaining lines
- Testing provisions for deployment, including submerged

Ditching Survival Equipment ETSOs

ASD-STAN Standardization

Domain 12 “Cabin”, WG02 Ditching Equipment

Rotorcraft Emergency Breathing Systems

EN 4856 P1: Published Sept 2017

prEN 4856 P2: Published June 2022

Rotorcraft Constant Wear Life Jacket

prEN 4862 P1: Published Feb 2022

Rotorcraft Immersion Suit

prEN 4863 P1: Published May 2022

Rotorcraft Life Raft

prEN 4886 P1: to be published

✓ RMT.0120 recommendations considered

- ETSO-2C519 EBS published
- ETSO future amendment(s)

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Research

EASA.2019.HVP.18: New Flotation Systems

- Received funding from the **European Union's Horizon 2020** research and innovation programme
- The research action is based on the Horizon 2020 Work Programme Societal Challenge 4 '**Smart, green and integrated transport**'

Awarded to: DART AEROSPACE

OBJECTIVE: provide answers to technical issues regarding the feasibility of providing a step change in occupant survivability following capsize of a helicopter through the introduction of an air pocket scheme utilising flotation units mounted high up on the helicopter fuselage.

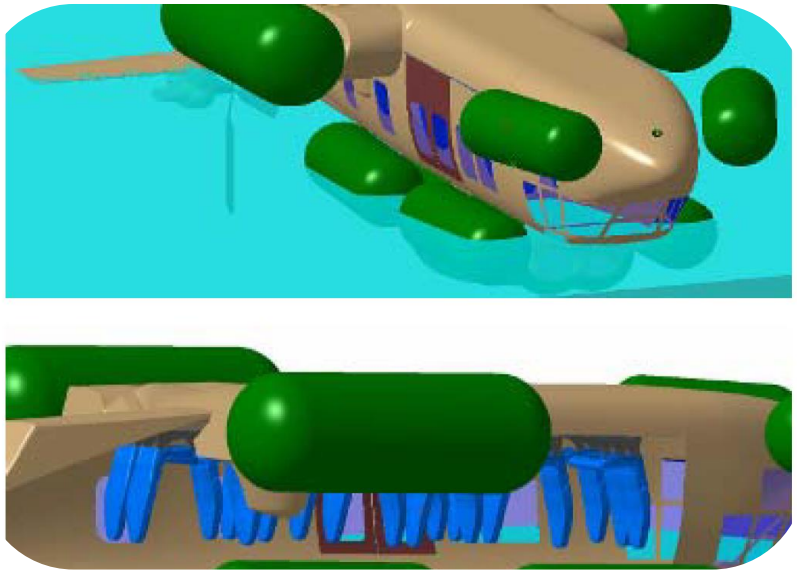
June 2020 to June 2023

EASA.2019.HVP.18: New Flotation Systems

BACKGROUND:

- → Capsize resistance extremely challenging to achieve in all emergency situations
- → Following capsize, drowning is the most likely cause of fatalities
- → Incompatibility between breath-hold capability and required time to escape

EXTENSIVE RESEARCH PREVIOUSLY PERFORMED → "AIR-POCKET"

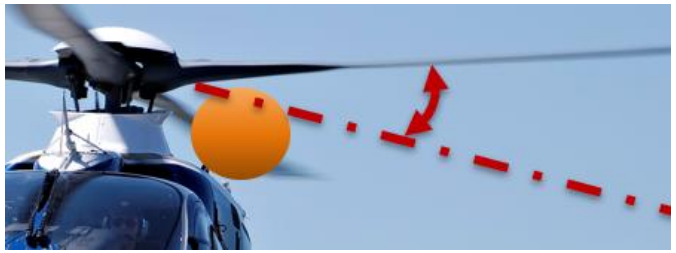


EASA.2007.C16

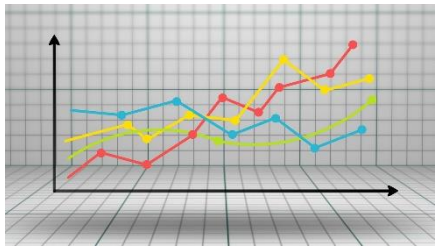
- ✓ Air pocket can be achieved with addition of high mounted EFS
- ✓ Capsized floating attitude with sufficient portion of the cabin above the water line
- ✓ Sizing and location assessed
- ✓ Feasibility of solution validated by wave tank testing to confirm the hydrodynamic performance
- ✓ Human subject trials to establish feasibility of egress

Technical issues highlighted which require further investigation

EASA.2019.HVP.18: New Flotation Systems

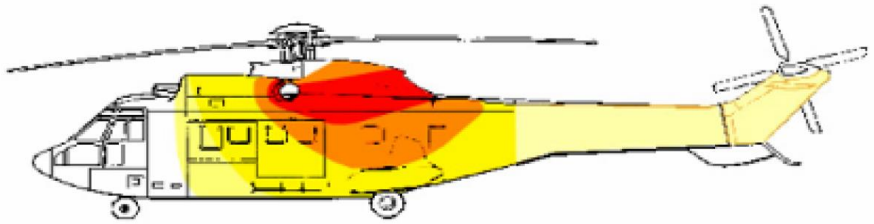


Inadvertent Deployment leading to interference with MR



Adverse aerodynamic effects

TECHNICAL ISSUES



Degradation from hot engine exhaust

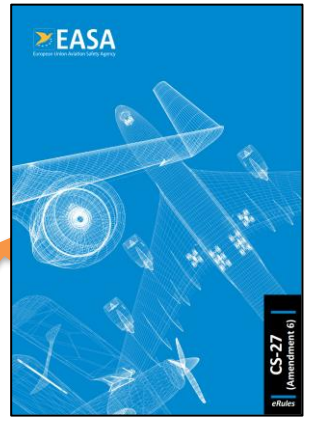
Avoidance of damage due to MR debris at water entry

Overall integration issues

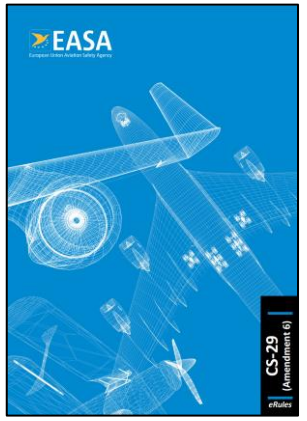
EASA.2019.HVP.18: New Flotation Systems

RESEARCH CONCLUSION

REGULATORY ACTION NECESSARY?

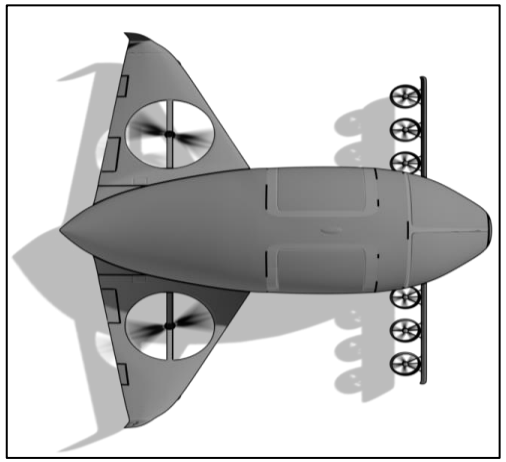


CS-27



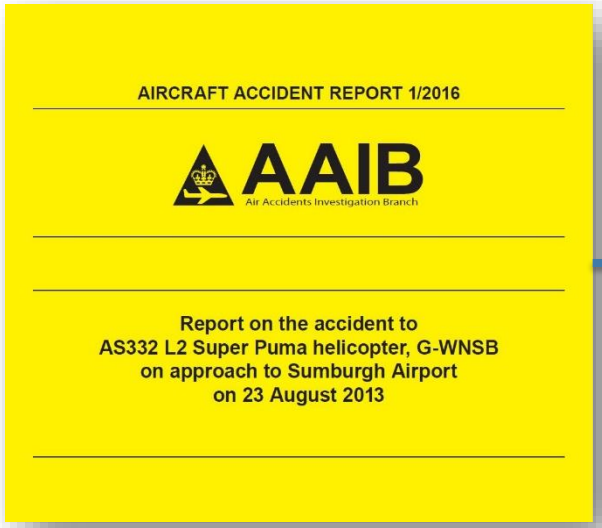
CS-29

AIR OPS



SC VTOL MOC

Helicopter Underwater Escape (#1)


AIRCRAFT ACCIDENT REPORT 1/2016

AAIB
Air Accidents Investigation Branch

Report on the accident to
AS332 L2 Super Puma helicopter, G-WNSB
on approach to Sumburgh Airport
on 23 August 2013

AS332 Super Puma G-WNSB Sumburgh, UK, 23 August 2013

*Safety Recommendation 2016-016: "It is recommended that the European Aviation Safety Agency instigates a **research programme** to provide **realistic data** to better **support regulations** relating to **evacuation and survivability of occupants** in commercial helicopters operating offshore. This programme should better quantify the characteristics of **helicopter underwater evacuation** and include conditions representative of actual offshore operations and passenger demographics."*

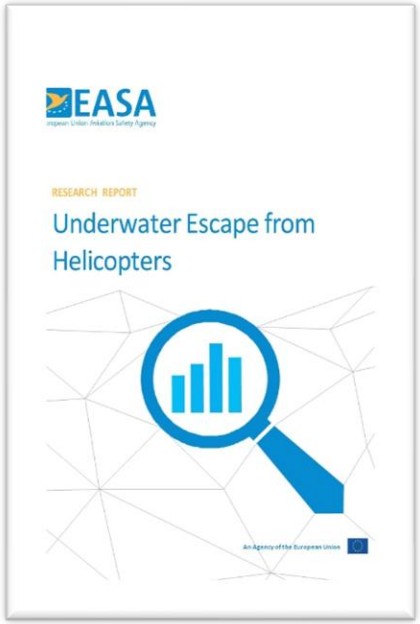
Initial review into the nature of the research that could be envisaged

UK Civil Aviation Authority International

TASKS:

1. Analysis of the currently available information
2. Analysis of shortfalls
3. Recommendation of future research activities

Completed November 2020



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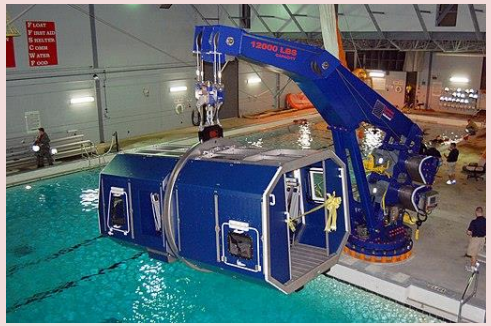
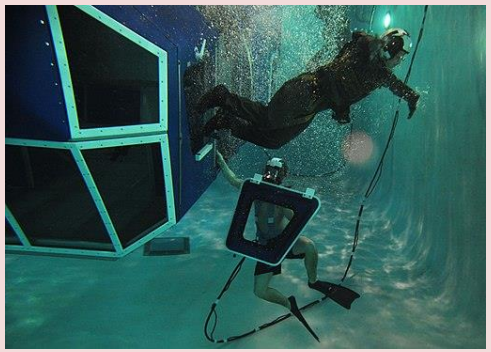
Helicopter Underwater Escape (#1, #2)

3 high potential benefit projects identified:

Forces required to jettison push-out underwater emergency exits



Underwater escape from the passenger cabin with a full complement of passengers



Passenger training fidelity and frequency

2 projects selected

- This project will be funded from the European Union's Horizon Europe research and innovation programme
- April 2022 to April 2024
- Awarded to UK CAA International

UK Civil Aviation Authority International

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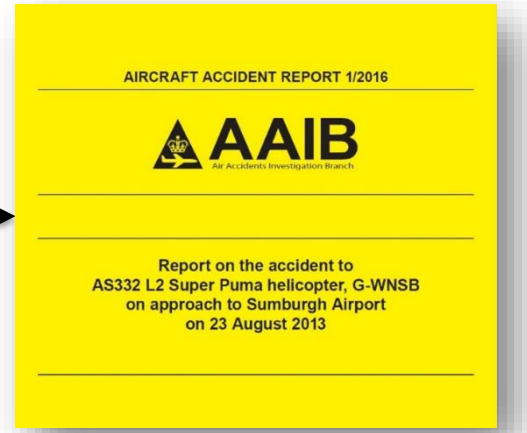
Helicopter Underwater Escape (#2)

Task 1: Forces required to jettison push-out underwater emergency exits	Task 2: Underwater escape from the passenger cabin with a full complement of passengers
• Evaluate influence of being underwater on the required force • Determine the forces that human test subjects can apply • Establish an appropriate maximum force for underwater exits • Confirm current AMC or propose a future revision	• Quantify underwater escape process in capsized helicopter • Determine if expectation of 60sec escape is achievable • Validate the current CS27 & CS29 requirements and AMC or propose a future revisions

REGULATORY ACTION NECESSARY?

CS-27 CS-29 AIR OPS ETSO

SC VTOL MOC



SR 2016-016

Research Summary

EASA.2019.HVP.18: New Flotation Systems

- June 2020 to June 2023
- Technical issue investigation regarding introduction of an air pocket scheme utilising flotation units mounted high up on the helicopter fuselage

Helicopter Underwater Escape #1

- Initial review into research that could be envisaged to respond to Safety Recommendation 2016-016
- Completed November 2020

Helicopter Underwater Escape #2

- April 2022 to April 2024
- Aims to fully address Safety Recommendation 2016-016
- Task 1: Forces required to jettison push-out underwater emergency exits
- Task 2: Underwater escape from the passenger cabin with a full complement of passengers

Summary

RMT.0120
Ditching Occupant Survivability

RMT.0392

AIR OPS

SPA.HOFO review

CS-27

CS-29

RMT.0120 PHASE 1:
Completed June 2018

Part-26 / CS-26

RMT.0120 PHASE 2:
NPA Comment review ongoing

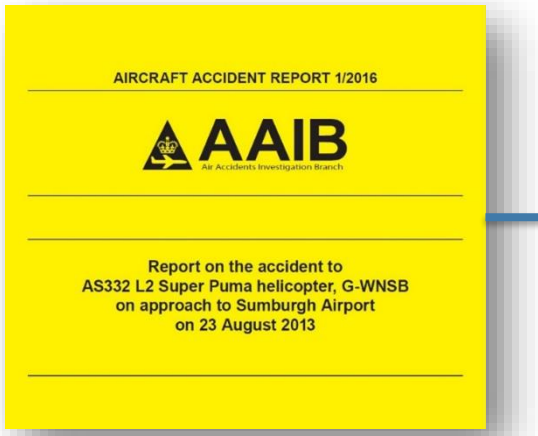
ASD-STAN

ETSO

Ditching Survival Equipment Standards

EASA.2019.HVP.18: New Flotation Systems
Ongoing: June 2020 to June 2023

Summary



Helicopter Underwater Escape #1

Completed November 2020

Helicopter Underwater Escape #2

Ongoing: April 2022 to April 2024

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Any questions?

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Back-up slides

SUMMARY OF PART 26 REQUIREMENTS

Summary of requirements

→ “Simple” changes: ***9 AUGUST 2023***

Title	Topic	Part 26	CS 27/29 Amdt. 5
Underwater Emergency controls	Black & yellow	26.410	27.1555(d)(2) 29.1555(d)(2)
Underwater Emergency Exits	Black & yellow	26.415(a)(1)	27.805(c), 27.807(d)(5) 29.811(h)(2)
	4 pax per pair	26.415(a)(2)	27.807(d)(1) 29.807(d)(1)
	Seat location	26.415(a)(3)	
Underwater Emergency Exits (CS-27 Cat A & CS-29 only)	Max Force (Flight crew)	26.415(b)(1)	27.805(c) 29.805(c), 29.809(c)
	Max Force (Pax)		27.807(b)(2), (d) 29.807(d), 29.809(c)
	HEELS	26.415(b)(2)	29.811(h)(1)

Summary of requirements

→ “Simple” changes: ***9 AUGUST 2023***

Title	Topic	Part 26	CS 27/29 Amdt. 5
Emergency Equipment	Life raft long line	26.420(a)	27.1415(b)(2) 29.1415(b)(2)
	Life preservers easy reach	26.420(b)	27.1415(c) 29.1415(c)
Sea Conditions	Published in RFM	26.425	27.1587(b)(3) 29.1587(c)

Summary of requirements

→ "Medium" complexity: ***9 AUGUST 2024***

Title	Topic	Part 26	CS 27/29 Amdt. 5
Emergency Equipment (CS-29 only)	Remotely deployable life raft	26.420(c)	29.1415(b)(1) 29.1561(a), (c)
Auto Deployment (CS-27 only)	Auto Deploy	26.435(a)	27.801(c)(2)

→"High" complexity: ***9 AUGUST 2025 and 9 AUGUST 2026***

Title	Topic	Part 26	CS 27/29 Amdt. 5
EFS Robustness	Design Review	26.430, 26.431	27.801(c)(1) 29.801(c)(1)
Auto Deployment (CS-27 Cat A & CS-29 only)	Auto Arm and Deploy	26.435(b)	29.801(c)(2)