European Union Aviation Safety Agency

Explanatory Note to ED Decision 2023/021/R

in accordance with Article 4(2) of MB Decision 01-2022

Regular update of CS-25

CS-25 — Amendment 28

RMT.0673

EXECUTIVE SUMMARY

The objective of this Decision is to reflect the state of the art of large aeroplane certification based on information gathered from in-service occurrences and certification projects.

This Decision amends the Certification Specifications and Acceptable Means of Compliance for Large Aeroplanes (CS-25) in order to:

(a) provide consolidated specifications, guidance and acceptable means of compliance related to survivability after ditching (i.e. emergency landing on water);

(b) improve the specifications, guidance and acceptable means of compliance applicable to installed systems and equipment for use by the flight crew;

(c) make various amendments dealing with the following topics: development assurance, performance and handling characteristics in icing conditions, brakes and braking systems certification tests and analysis, oxygen equipment and supply, the maximum period during which the air conditioning is off and cabin crew portable oxygen equipment;

(d) make editorial corrections.

Overall, the amendments are expected to increase safety, not to have any social or environmental impacts and to provide economic benefits by streamlining the certification process.

	ED DECISION(S) TO BE AMENDED — ED Decision 2003/2/RM (CS-25 — Initial Issue)

AFFECTED STAKEHOLDERS

Design organisations (large aeroplane)

WORKING METHODS

Development	Impact assessment(s)	Consultation
By EASA	Light	NPA — Public

RELATED DOCUMENTS / INFORMATION

- ToR RMT.0673
- NPA 2022-07
- CRD 2022-07

PLANNING MILESTONES: Refer to the latest edition of the EPAS Volume II.

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1. About this Decision

1.1. How this regulatory material was developed

The European Union Aviation Safety Agency (EASA) identified the need to mitigate some safety risks and reflect the state of the art of large aeroplane certification in CS-25. After assessing the impacts of the possible intervention actions, EASA identified rulemaking as the necessary intervention action.

This rulemaking activity is included in Volume II of the European Plan for Aviation Safety (EPAS) 2023–2025[1] under Rulemaking Task (RMT).0673.

EASA developed this ED Decision in line with Regulation (EU) 2018/1139 (the 'Basic Regulation')[2] and the Rulemaking Procedure[3], as well as in accordance with the objectives and working methods described in the Terms of Reference (ToR) for this RMT[4].

The draft regulatory material was consulted in accordance with the ToR for this RMT with Notice of Proposed Amendment (NPA) 2022-07[5].

EASA reviewed the comments received and duly considered them for the preparation of the regulatory material presented here.

1 https://www.easa.europa.eu/en/document-library/general-publications/european-plan-aviation-safety-epas-2023-2025

2 Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1535612134845&uri=CELEX:32018R1139).

3 EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board and is referred to as the 'Rulemaking Procedure'. See MB Decision No 01-2022 of 2 May 2022 on the procedure to be applied by EASA for the issuing of opinions, certification specifications and other detailed specifications, acceptable means of compliance and guidance material ('Rulemaking Procedure'), and repealing Management Board Decision No 18-2015 (https://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-01-2022-rulemaking-procedure-repealing-mb).

4 https://www.easa.europa.eu/en/document-library/terms-of-reference-and-rulemaking-group-compositions

5 In accordance with Article 115 of Regulation (EU) 2018/1139 and Articles 6(3) and 7 of the Rulemaking Procedure.

2. In summary — why and what

2.1. Why we need to act

Certification specifications (CSs), acceptable means of compliance (AMC) and guidance material (GM) need to be updated regularly to ensure that they are fit for purpose, cost-effective and can be implemented in practice. Lessons learnt from accident and incident investigations may also be addressed in regular updates when the topic is not complex and not controversial.

Within this frame, EASA identified the need to amend CS-25 to address the following eight items.

Item 1. Ditching survivability

Item 1.1. Planned and unplanned ditching

For many years it has been an accepted certification practice to show compliance with CS-25 ditching specifications (i.e. CS 25.563 and CS 25.801) by addressing two scenarios: planned ditching and unplanned ditching.

In the planned ditching case, it was typically assumed that there is sufficient time to prepare the aeroplane and occupants for a planned water landing in open seas. Allowances were generally made for jettisoning or burning off fuel or closing openings (e.g. outflow valves) and generally optimising the aeroplane to maximise the chances of occupant survival. The flotation analysis needed to account for structural damage that was likely to occur during the planned water landing.

In the unplanned ditching case, it was generally assumed that sufficient time did not exist to prepare the aeroplane and occupants. The event was considered to usually be associated with a failed or aborted take-off at an airport adjacent to a large body of water. Flight crew actions such as closing openings in the fuselage or reducing the aeroplane weight by burning fuel were generally assumed not to occur. Therefore, the aeroplane would initially sit lower in the water and may sink at a faster rate than in the planned ditching event. Accordingly, aeroplane evacuation was more time critical. The flotation analysis did not account for structural damage resulting from the water landing.

The analysis of the Hudson River accident (Airbus A320; US Airways flight 1549 on 15 January 2009, in New York City, United States) revealed the need to reinforce the structural analysis associated with the investigation of planned ditching scenarios for CS-25 certification considering, as much as practicable, the variation of the flight parameters with respect to the optimal attitude angles at impact of the aeroplane with water, to cover most of the realistic scenarios. This reinforcement of the structural analysis would address intermediate scenarios between the planned ditching and unplanned ditching scenarios, as illustrated by the Hudson River accident. In this manner, the different types of ditching scenarios are covered.

In the Hudson River accident, the aeroplane experienced loss of thrust in both engines, a situation not addressed in the current ditching requirements. In response, CS 25.671(d) was amended (CS-25 Amendment 24) to require that the aeroplane is designed so that it is controllable if all engines fail at any time of the flight and so that a flare to a ditching can be achieved.

The current CSs related to ditching (CS 25.563, CS 25.801, CS 25.671) lack detailed provisions addressing the planned ditching and unplanned ditching scenarios.

Independently from the request by the applicant for certification with ditching provisions[6], EASA considers that, following an unplanned ditching, the flotation time and the attitude of the aeroplane must allow the occupants to safely leave the aeroplane.

In addition, when ditching provisions are requested for certification, EASA considers that the airframe structures must withstand ditching loads, by considering reasonable variations in the flight parameters when the aeroplane impacts the water, and that the flotation time and attitude of the aeroplane must also allow the occupants to enter a life raft. This is associated with a planned ditching scenario.

Aeroplane flight manual procedures for ditching with reduced engine power / no engine power conditions are not completely addressed, in particular the aspects related to the preparation of the aeroplane before performing the ditching.

Under the current specifications, which do not describe the planned ditching and unplanned ditching scenarios in sufficient detail, new applicants are not made aware of the expected certification practice and may miss the opportunity to address the intermediate ditching scenarios involving a variation of flight parameters.

The ditching emergency exits required to allow occupant evacuation are considered to already be adequately addressed in existing certification specifications.

In practice, most of the CS-25-certified aeroplanes are designed with ditching provisions to provide operators with the possibility to operate their aeroplanes on overwater flights.

Item 1.2. Structural ditching analysis

CS-25 does not include guidance material or acceptable means of compliance to support applicants in the development of the structural ditching analysis as required under CS 25.563 (for planned ditching).

The absence of such GM and AMC implies that the expected structural reinforcement and strength of the aeroplane may not be incorporated at a level sufficient to adequately protect occupants, thereby potentially resulting in an unacceptable risk of occupant injuries or fatalities after a planned ditching.

Following the Hudson River accident, EASA issued an Interpretative Material (IM) Certification Review Item (CRI) on Structural Ditching Conditions for new aeroplane designs. In that IM CRI, the scenarios of planned ditching and unplanned ditching are addressed. The content of this CRI was taken into account in the recommendations made by the Transport Aircraft Crashworthiness and Ditching Working Group[7], which issued a report to the Federal Aviation Administration (FAA) (revision B, dated 20 September 2018).

In this EASA IM CRI, a variety of flight parameters for planned ditching are considered in order to allow a conservative analysis addressing scenarios in which the aeroplane does not reach the optimal attitude parameters during the flare to ditching.

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6 For example to allow operation on overwater flights as prescribed in point CAT.GEN.MPA.150 (Ditching – aeroplanes) of Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R0965&qid=1649401475582).

7 A working group established by the Aviation Rulemaking Advisory Committee following a task assigned by the FAA. Refer to the notice in the US Federal Register, Vol. 80, No 107, 4 June 2015.

Item 1.3. Buoyancy — evacuation analysis

CS-25 does not define an adequate time to evacuate all passengers and crew from the aeroplane after a ditching event (as per CS 25.801(d)).

Therefore, for each new certification project, applicants and EASA have to agree on means of compliance with CS 25.801(d). Applicants are currently not informed in an early phase of EASA's expectations in relation to addressing both planned and unplanned ditching scenarios, which may lead to the need to make substantial modifications at an advanced phase of the design development.

A dedicated AMC would therefore be beneficial to inform applicants of EASA's expectations.

EASA issued a means of compliance (MOC) CRI called 'Unplanned Ditching – Evacuation', for new aeroplane designs, more than 15 years ago. The content of this CRI can now be considered for the development of a new AMC in CS-25. The content of this CRI was taken into account in the recommendations made by the Transport Aircraft Crashworthiness and Ditching Working Group, which issued a report to the FAA (revision B, dated 20 September 2018).

Item 2: AMC 25.1309 System design and analysis — Development assurance and AMC-20 references

Section 13 'Assessment of modifications to previously certified aeroplanes' of AMC 25.1309 does not include guidance on the evaluation of existing development assurance data to perform a modification.

Information gathered from modified large aeroplanes shows that such assessment has not always been adequately performed, thereby leading to development errors not being captured.

AMC 25.1309 does not include references to some recent AMC 20 documents:

— AMC 20-152A: Development Assurance for Airborne Electronic Hardware (AEH),

— AMC 20-189: The Management of Open Problem Reports (OPRs),

— AMC 20-193: Use of multi-core processors.

Item 3. Installed systems and equipment for use by the flight crew

EASA recently amended CS-27 (Amendment 8) and CS-29 (Amendment 9) to introduce new certification specifications (CS 27/29.1302) for a human factors (HF) assessment of installed systems and equipment intended for use by flight crew members, and the corresponding AMC and GM.

These new rotorcraft CSs, AMC and GM have been drafted taking CS 25.1302 and AMC 25.1302 as a baseline. Indeed, HF principles applied to cockpit and system designs are relevant to all aircraft types, including the new generation of complex rotorcraft.

While the text of CS 27/29.1302 is largely identical to the text of CS 25.1302, the content of AMC 25.1302, used to develop the rotorcraft AMC and GM, has been significantly restructured and reworded in order to adapt it to the different types of operations and the related operational scenarios that could be performed by rotorcraft.

In addition, some improvements and clarifications have been introduced on the basis of the experience gained and lessons learnt during recent certification projects for large aeroplanes. Therefore, these improvements and clarifications should be considered for introduction in AMC 25.1302 to align it with the recently published AMC and GM for rotorcraft.

Item 4. Performance and handling characteristics in icing conditions

In AMC 25.21(g) (Performance and handling characteristics in icing conditions), paragraph 4.6.5 reads as follows:

> *For failure conditions that are extremely remote but not extremely improbable, the analysis and substantiation of continued safe flight and landing, in accordance with CS 25.1309, should take into consideration whether annunciation of the failure is provided and the associated operating procedures and speeds to be used following the failure condition.*

According to AMC 25.1309:

- *Remote failure conditions are those having an average probability per flight hour of the order of 1×10^{-5} or less, but greater than of the order of 1×10^{-7}.*
- *Extremely remote failure conditions are those having an average probability per flight hour of the order of 1×10^{-7} or less, but greater than of the order of 1×10^{-9}.*
- *Extremely improbable failure conditions are those having an average probability per flight hour of the order of 1×10^{-9} or less.*

Therefore, the condition 'extremely remote but not extremely improbable' is not logical and does not provide the intended interval of probabilities (i.e. greater than 10^{-9} and equal to or lower than 10^{-5}). Indeed, probabilities greater than 10^{-7} and equal to or lower than 10^{-5} are not addressed by the current text.

Item 5. Brakes and braking systems certification tests and analysis

In Amendment 18 to CS-25, EASA introduced the content of the Certification Memorandum entitled 'Respecting Brake Energy Qualification Limits' into AMC 25.735. A new subparagraph (2) was inserted in paragraph 4 (DISCUSSION), Section a. (Ref. CS 25.735(a) Approval). This necessitated a renumbering of the subsequent subparagraphs to (3) and (4). However, during this renumbering, an editorial change within the text of renumbered subparagraph (4) was omitted. The text 'not addressed under paragraph 4a(2) of this AMC' should read 'not addressed under paragraph 4a(3) of this AMC'.

In addition, AMC 25.735 was reviewed for additional editorial errors, and it is apparent that the layout of the text in the AMC could cause the applicability of some parts to be misinterpreted.

Item 6. Oxygen equipment and supply

EASA identified that the content of some means of compliance approved by EASA during past certification projects is not adequately reflected in paragraph 3.3 (Ventilation) of AMC 25.1441(b) (Risk assessment related to oxygen fire hazards in gaseous oxygen systems).

Item 7. Air conditioning 'off' – maximum time period

In Amendment 23 of CS-25, EASA amended AMC 25.831(a) (Ventilation).

The new paragraph 3 addresses the operations with the air conditioning system 'off'. Subparagraph e of this paragraph specifies that:

> *the period during which the aeroplane is operated with the air conditioning system 'off' is intended to be of short duration. Therefore, the maximum time period allowed for the operation of an aeroplane in this configuration should be defined by the applicant and specified in the appropriate operating manuals, along with any related operating procedures that are necessary to ensure that the above items are addressed.*

Since this amendment, discussions with applicants have revealed that the term 'the maximum time period' created some concerns. Indeed, on some aeroplanes the method used to detect and alert the flight crew about a configuration with air conditioning 'off' may be based not on elapsed time but on other criteria such as transition to the climb phase or reaching a certain height or altitude.

Item 8. Cabin crew portable oxygen equipment

During various CS-25 type certification projects, EASA identified a misinterpretation by applicants of the content of CS 25.1443(d) and (e).

CS 25.1443(d) requires that 'If first-aid oxygen equipment is installed, the minimum mass flow of oxygen to each user may not be less than 4 litres per minute, STPD.'

CS 25.1443(e) requires that 'If portable oxygen equipment is installed for use by crew members, the minimum mass flow of supplemental oxygen is the same as specified in sub-paragraph (a) or (b) of this paragraph, whichever is applicable.'

These paragraphs do not state that the installation of portable oxygen equipment (POE) is optional or that, if installed, its usage could be limited to first aid application.

POE is required safety equipment as stated in CS 25.1447(c)(4) (i.e. if certification for operation above 7 620 m (25 000 ft) is requested): 'Portable oxygen equipment must be immediately available for each cabin crew member'.

A generic Interpretative Material CRI has been used by EASA and applicants to clarify the meaning of the specifications applicable to POE to be used by cabin crew members.

The content of this CRI is sufficiently mature and generic to be introduced in CS-25.

Editorial corrections

The need for several editorial corrections has been identified, as explained in Section 2.3 below.

2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of the Basic Regulation. This Decision will contribute to achieving the overall objectives by addressing the issue(s) described in Section 2.1.

The specific objective of this Decision is, therefore, to amend CS-25 based on the selection under RMT.0673 (Regular update of CS-25) of non-complex, non-controversial and mature subjects, with the ultimate goal being to increase safety.

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

CS-25 is amended as follows:

Item 1. Ditching survivability

Item 1.1. Planned and unplanned ditching

Amend CS 25.563 (Structural ditching provisions) and CS 25.801 (Ditching) to reflect in the specifications the planned and unplanned ditching scenarios that have been considered in practice, including the need to consider the variation of flight parameters for the planned ditching scenario.

Item 1.2. Structural ditching analysis

Create an AMC 25.563 (Structural ditching provisions) to provide consolidated guidance and acceptable means of compliance related to the structural ditching analysis applicable to the planned ditching scenario, where an optimum configuration of the aeroplane is assumed at the time of contact with water, involving a variation of parameters with respect to that optimum configuration.

Item 1.3. Buoyancy —evacuation analysis

Amend AMC 25.801 to provide consolidated guidance and acceptable means of compliance related to the adequate buoyancy time analysis to allow all passengers and crew to evacuate the aeroplane.

Item 2. AMC 25.1309 System design and analysis — Development assurance and AMC-20 references

Amend AMC 25.1309 to:

— introduce in Section 13 ‘Assessment of modifications to previously certified aeroplanes’ changes related to the assessment of the impact that a modification may have on the development assurance data previously used for showing compliance with CS 25.1309;

— add in Section 3 ‘Related documents’ and Section 9 ‘Compliance with CS 25.1309’, references to the following AMC 20 documents:

- AMC 20-152A: Development Assurance for Airborne Electronic Hardware (AEH),
- AMC 20-189: The Management of Open Problem Reports (OPRs),
- AMC 20-193: Use of multi-core processors.

Item 3. Installed systems and equipment for use by the flight crew

Amend CS 25.1302 to clarify the text and align it with CS 29.1302.

Amend AMC 25.1302 as follows:

— restructure the existing material, including by moving all the informative elements and some explanatory material to the new GM1 25.1302 and GM2 25.1302;

— make several clarifications throughout the text;

— introduce a new figure to show the methodological approach to the certification for design-related HF issues (refer to paragraph 3.1);

— ensure that the new ‘level of involvement’ concept (refer to points 21.A.15(b)(5) and (6) of Part 21) is reflected wherever the involvement of EASA is described;

— clarify and expand the certification strategy (refer to paragraph 3.3.1);

— add methodological considerations applicable to HF assessments, including scenario-based approaches (refer to paragraph 3.3.2);

— reword some definitions and add new definitions;

— add a paragraph in Section 5 to provide guidance regarding the possibility to take some credits for compliance demonstration from previous compliance certification processes;

— add clarifications in Section 5 in order to describe the main criteria to be considered while assessing the representativeness of the test articles used during compliance demonstration.

Item 4. Performance and handling characteristics in icing conditions

Amend paragraph 4.6.5 of AMC 25.21(g) to specify failure conditions that are 'remote or extremely remote'. This harmonises with the equivalent range of probabilities provided in FAA Advisory Circular 25-25A, paragraph 2.6.4.

Item 5. Brakes and braking systems certification tests and analysis

Amend AMC 25.735 as follows:

— in paragraph 2, update the references to regulatory material to reflect the current titles;

— in paragraph 4.a(4), replace the reference to paragraph 4.a(2) with a reference to paragraph 4a(3);

— move the final two sentences of paragraph 4.a(1)(e) to paragraph 4.a(1) so that it is clear that they do not apply only to paragraph 4.a(1)(e);

— add an introduction sentence and a numbering 4.a(5) before subparagraphs (a) to (d) in the current paragraph 4.a(4) to make it clear that these subparagraphs apply not only to 4.a(4) 'Replacement and Modified Equipment' but also to 4.a(3) 'Refurbished and Overhauled Equipment';

— amend the text of 4.a(4)(b) (now renumbered 4.a(5)(b)) 'Major Changes' to include changes to the brake as well as the wheel.

Item 6. Oxygen equipment and supply

Amend paragraph 3.3 (Ventilation) of AMC 25.1441(b) (Risk assessment related to oxygen fire hazards in gaseous oxygen systems) to provide a more generic text that reflects already approved means of compliance and harmonises with the content of Section 1.2 of FAA Policy Statement PS-ANM-25.1441-01 (Mitigating Fire Hazards in Gaseous Oxygen Systems), dated 9 December 2014.

Item 7. Air conditioning 'off' – maximum time period

Amend AMC 25.831(a) to remove 'time' and 'for the operation of an aeroplane' in paragraph 3(e) in order to provide a more generic wording so as to allow applicants to propose different criteria to control the flight duration with the air conditioning 'off'.

Item 8. Cabin crew portable oxygen equipment

Introduce the content of the generic IM CRI used by EASA and applicants to clarify the meaning of the specifications applicable to POE to be used by cabin crew members. This will be achieved by:

— creating AMC 25.1443(e) (Minimum mass flow of portable oxygen equipment) to explain when CS 25.1443(a) or (b) specifications are applicable;

— amending AMC 25.1447(c)(4) (now entitled 'Equipment standards for portable oxygen equipment') to add guidance and acceptable means of compliance for POE installed to allow cabin crew mobility in aeroplanes where the passenger oxygen system design allows for levelling off at altitudes between 3 048 m (10 000 ft) and 7 620 m (25 000 ft) after a depressurisation event;

— creating AMC 25.1449 (Means for determining use of oxygen) to highlight that the specification applies to all POE, and indicating acceptable means of compliance.

Editorial corrections

The following corrections have been made:

— CS 25.107 (Take-off speeds)

In subparagraph (g), a typographical error has been corrected: the word 'less' appears twice, and one instance has been replaced by the word 'be', which is missing.

— CS 25.335 (Design airspeeds)

An error has been present since CS-25 Amendment 13, which amended CS 25.335. The Change Information file of this amendment is correct, but a typographical error was made in the actual CS-25 Amendment 13 file. In paragraph (b)(1)(i): 'aerodynamic data issued' has been corrected to read 'aerodynamic data is used'.

— AMC 25.143(a) and (b) (Controllability and Manoeuvrability)

AMC 25.143 makes reference to 'water waves'. However, CS-25 does not include seaplanes and ski-planes in its scope. This error has been present since the Initial Issue of CS-25 and probably originates from harmonisation with an equivalent FAA document dating back to Joint Aviation Authorities activities (the FAR 25 scope includes seaplanes and amphibians). Therefore, the term 'water waves' has been removed from this AMC.

— AMC 25.1581 (Aeroplane flight manual)

In paragraph 2 ('RELATED CERTIFICATION SPECIFICATIONS'), the list is not complete as it does not include all the paragraphs of section 'Supplementary information' of Subpart G. The list has therefore been corrected.

— Appendix A

In Figure 6, the values $D_N = 8\ V_N$ and $D_M = 8\ V_M$ are not correct. They have been corrected to read $0.8\ V_N$ and $0.8\ V_M$, respectively. This error has been present since the Initial Issue of CS-25.

— References to the EUROCAE ED-14 / RTCA DO-160 standard

The ED-14/DO-160 standard is used in different AMC but the revision number differs across the AMC and it does not always reflect the latest revision. The references have been updated, when necessary, to refer to the latest revision, 'G', that is recognised by EASA.

2.4. Stakeholders' views

Overall, the comments received sought clarifications or complementary guidance/information. EASA used these comments to improve the proposed CS-25 amendment.

It can be noted that most comments were directed towards item 1 'Ditching survivability' and item 3 'Installed systems and equipment for use by the flight crew'. A summary of the essential changes made regarding these two items as a result of the analysis of the comments is provided in comment-response document (CRD) 2022-07.

Individual responses to comments are provided in Chapter 2 of CRD 2022-07.

3. Expected benefits and drawbacks of the regulatory material

The amendments reflect the state of the art of large aeroplane certification. Overall, Amendment 28 will provide a moderate safety benefit, will have no social or environmental impacts and will provide some economic benefits by streamlining the certification process.

4. Monitoring and evaluation

EASA will assess the implementation of this CS-25 amendment through the following:

— the information gathered during CS-25 certification projects carried out after this amendment;

— the monitoring of the rules under the normal continuing airworthiness process that is followed by EASA and type certificate holders;

— the investigation of occurrences and the analysis of safety recommendations issued to EASA by designated safety investigation authorities.

5. Proposed actions to support implementation

N/A

6. References

6.1. Related EU regulations

— Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 224, 21.8.2012, p. 1).

6.2. Other reference documents

— Transport Aircraft Crashworthiness and Ditching Working Group Report to the FAA, revision A, dated 10 May 2018.

— National Transportation Safety Board Accident Report NTSB/AAR-10/03, *Loss of thrust in both engines after encountering a flock of birds and subsequent ditching on the Hudson River – US Airways flight 1549, Airbus A320-214, N106US – Weehawken, New Jersey, January 15, 2009*.