



GAMA 16-32

June 20, 2016



European Aviation Safety Agency
Certification Policy and Safety Information Department
Certification Directorate
Hermann-Pünder-Straße 3, 50679
Cologne, Germany

Dear Sir or Madam,

The General Aviation Manufacturers Association (GAMA) is an international trade association representing over 80 of the world's leading manufacturers of general aviation airplanes and rotorcraft, engines, avionics, components and related services. GAMA's members also operate repair stations, fixed based operations, pilot and maintenance training facilities and they manage fleets of aircraft.

The AeroSpace and Defence Industries Association of Europe (ASD) represents the Aeronautics, Space, Security and Defence industries in Europe. Based in Brussels, the organisation's membership today comprises 14 major European aerospace and defence companies and 26 member associations in 19 countries.

GAMA and ASD appreciate the opportunity to provide feedback to EASA NPA 2016-01 Helicopter Ditching and Water Impact Occupant Survivability, and offer the following comments for consideration. These comments are also attached in Microsoft Word format – included as an attachment to the covering email.

Summary of Key Observations:

In general, although the Industry review of this proposal found that the majority of the amendments proposed in this NPA would be beneficial to the safety of rotorcraft operating offshore, we consider that:

1. The proposal could negatively impact small, non-Category A CS-27 helicopters whereas Section 4.1.3 titled "Who is affected?" providing a summary of the European offshore fleet, lists only multiengine helicopters.
Single-engine helicopters are currently used for over-water sight-seeing flights, charter flights between small islands in the Mediterranean Sea, and fish spotting as a few examples, i.e. conditions where the water is not a hostile environment. These helicopters are typically fitted with emergency flotation equipment but not fully certified for ditching, following the guidance of AC 27-1B MG 10. The NPA replaces the existing guidance with significant aspects of the revised ditching requirement for emergency flotation equipment.
The cost and practicalities of compliance with the new requirements are likely to be prohibitive. Basic emergency flotation systems have been in use on smaller CS-27 rotorcraft for many years and offer significant safety benefits even without some of the ditching-specific items such as water impact velocity considerations and evaluation of exits in the capsized condition. Eliminating the ability to certify simple, proven, real-world-usable flotation systems may result in a reduction rather than an enhancement in safety.
2. Post-capsize survivability mean of compliance - Air pocket is the main and highlighted MOC in AMC27 & AMC29 and Cat A EBS is presented as a non-acceptable MOC. We do consider that the technical maturity of air pocket is not demonstrated yet, leading to a number of potential additional safety risks. Consequently, the additional safety improvements introduced

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by the NPA (improved stability demonstration, improved emergency exit size, procedure, lighting and marking), we consider that the Cat A EBS does represent an efficient and realistic mean of compliance to the post-capsize survivability requirement and we propose Cat A EBS to be an AMC (NB: EBS would also be easier to be mandated for the in-service fleet in the future phase of rulemaking).

In addition, section 4.1.2. Safety Risk Assessment clearly states that ditching incidents are not a main source of fatalities; rather, survivable water impacts should be the focus area for where safety improvement is warranted. Rulemaking activity should perhaps focus on minimizing water impacts (e.g. via operating altitude or weather restrictions) rather than on enhancing floatation / ditching regulations which are apparently already sufficient.

The rationale for making ditching requirements more rigorous rather than addressing survivable water impacts is that there is an inherent difficulty in adequately defining a survivable water impact. In other words, because it is too difficult to attempt to address the problem of survivable water impacts through design requirements, ditching requirements have been made more arduous in the hope that a by-product will be improved safety during survivable water impacts.

Given the magnitude of the regulatory changes that are proposed, the justification for revision given in the safety risk assessment section seems inadequate.

A more detailed summary of Industry comments is attached and have been summarized as the following topic areas:

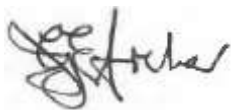
1. The operational impacts to single-engine Part-27 rotorcraft on implementing a prescribed floatation system solution;
2. Post capsized survivability – we do not agree with the means of compliance in AMC regarding air gap and it is not clear the safety benefit for the introduction of the prescribed solutions and propose Cat A EBS to be an AMC;
3. Stability demonstration on irregular waves –test methodology proposed in the AMC is of concern;
4. Water entry – additional clarification is required regarding these requirements, and
5. Emergency evacuation – the proposed emergency ditching procedures are required to be reflected in the AMC.

It is highly desirable for applicants that all EASA NPAs be coordinated with FAA NPRMs and the rulemaking procedures of other airworthiness authorities to ensure that harmonization is maximized.

GAMA and ASD appreciate your attention to these comments and would welcome the opportunity to answer any questions.

If you have any questions regarding these comments, please contact me at jarcher@gama.aero | +1 (202) 393-1500.

Respectfully,



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General Aviation Manufacturers Association



Kyle Martin
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AeroSpace and Defence Industries Association of Europe (ASD)

Attachment: GAMA16-32 Comment Matrix for EASA NPA 2016-01 Helicopter Ditching and Water Impact Occupant Survivability

Delivered via email: CM@easa.europa.eu

Reference #	Page or Paragraph	Comment	Recommendation
1.	General	<p>The NPA is raising the bar for any type of flotation system (ditching or not). Under CS-27 there would be three levels:</p> <ol style="list-style-type: none"> 1) EFS that needs to meet the structural ditching requirements of 27.563 and ditching requirements of 27.801, based on AMC 27 MG10. 2) EFS with ditching that needs to meet the structural ditching requirements of 27.563 and ditching requirements of 27.801 plus new egress and equipment requirements in CS-27. 3) Category A EFS which needs to meet the structural ditching requirements of 27.563 and ditching requirements of 29.801 (including side floats/air pocket) plus new egress and equipment requirements in CS-27 and part of CS-29. <p>Under CS-29 there would be two levels:</p> <ol style="list-style-type: none"> 1) EFS that needs to meet the structural ditching requirements of 29.563 and ditching requirements of 29.801 (including side floats/air pocket), based on AMC 29 MG10. 2) EFS with ditching that needs to meet the structural ditching requirements of 29.563 and ditching requirements of 29.801 plus new egress and equipment requirements in CS-29. <p>Because both CS-27 & 29 have eliminated the possibility of a simple flotation system, this has the potential to reduce availability these systems and reduce the level of safety for operators who do not want the expense (and additional weight) of ditching capability. In addition for CS-29 all flotation systems would need a side float/air pocket configuration.</p> <p>MG-10-The first sentence states, "This section pertains to emergency flotation systems used to provide buoyancy for rotorcraft not specifically certificated for ditching but performing over-water operations." Section c. (5) states, "Buoyancy requirements for emergency flotation systems should be a minimum of 25 percent excess buoyancy at maximum internal gross weight."</p>	<p>The regulations need be scalable to allow for simple EFS based on current requirements. The recommendation would be to have the following for CS-27 and CS-29 to allow for a safety continuum.</p> <p>Under CS-27:</p> <ol style="list-style-type: none"> 1) Simple EFS that meets the buoyancy requirements of 27.801 based on current MG10 guidance. 2) EFS with ditching requirements that meets the structural ditching requirements of 27.563 and ditching requirements of 27.801. 3) EFS with full ditching capability which meets the structural ditching requirements of 27.563, the ditching requirements of 27.801 plus CS-27 egress and equipment requirements (no requirement to meet any CS-29 requirements). <p>Under CS-29:</p> <ol style="list-style-type: none"> 1) Simple EFS that meets the buoyancy requirements of 29.801 based on current MG10 guidance. 2) EFS with ditching requirements that meets the structural ditching requirements of 29.563 and ditching requirements of 29.801. 3) EFS with full ditching capability which meets the structural ditching requirements of 29.563, the ditching requirements of 29.801 plus CS-29 egress and equipment requirements. <p>Operating rules, OGP standards, etc. should be used to dictate the level of safety required in different hostile or non-hostile environments. Private and general aviation operators should be able to choose the level of safety they desire for their personnel safety and not be forced to choose between safety and weight and cost.</p> <p>MG 10 is not applicable for ditching certification.</p>
2.	General	<p>The NPA and the RIA were written using existing fleet data. The conclusions in the RIA are not valid for the new, modern aircraft that would be required to meet these regulations. Rotorcraft with "real" Category A performance, improved reliability and improved situational awareness will have a much less likelihood of either a ditching or a water impact.</p>	<p>EASA is requested to reassess the conclusions within the RIA assuming modern aircraft which have greater performance, reliability and situational awareness.</p>

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		<p>Based on the values quoted in the RIA, it is also questionable on whether or not the development testing and optimization of additional floats installed on the upper fuselage of the helicopter was adequately accounted for. OEMs typically spend a great deal of time in flight testing optimizing the upper surfaces of the helicopter, and adding protrusions in these areas will not be a straightforward as it sounds.</p> <p>The summary of main impacts costs is too low by an order of magnitude.</p>	<p>Need to include both development costs and implementation costs into the summary.</p>
3.	General	Issues with global harmonization. Manufacturers under US and Canadian states of design will still be able to develop products to current regulations but not get EASA ditching certification. Manufacturers in the EU will have no choice but to meet the EASA rules.	Ensure a level playing field.
4.	General	The NPA has hidden the real intent of the proposed changes which is to improve safety for a “survivable” water entry and not ditching. EASA is open about this intent and argue that the reason the rules were not developed for survivable water impact was because they cannot define what a survivable water impact would be.	See previous recommendation about using a safety continuum model whereby there would be scalable requirements with full ditching capability accounting for the “survivable water impact” philosophy.
5.	27.563	Structural ditching provisions	Structural ditching provisions needs to be reviewed for impact
	27.563(a)	The requirement states for the most critical wave. This is inconsistent for irregular waves – i.e. rogue wave?	The requirement for the most critical wave needs re-wording
6.	CS29.563 / AMC29.563	<p>The "simplification" is confusing. LH proposed wording is included below to further clarify the intent to consider only the wave steepness of the most critical wave, and then determine impact speeds and angles relative to that surface. The wave shape and speed can be ignored and impact treated as onto a flat surface. Analysis is an acceptable means of deriving the loads. It is also proposed to remove the confusing, almost duplicated wording in the "procedures" section.</p>	<p><u>LH Proposed rewording to clarify new AMC29.563 (Changes in Bold):</u></p> <p>Draft amendment to CS-29 — Book 2</p> <p>1. Create a new AMC 29.563 as follows:</p> <p>AMC 29.563 Structural Ditching Provisions (a) Explanation. This AMC includes specific structural conditions to be considered to support the overall ditching provisions of CS 29.801. These conditions are to be applied to rotorcraft for which certification with ditching provisions is requested by the applicant.</p> <p>(1) The forward-speed landing conditions are specified as follows:</p> <p>(i) The rotorcraft should contact water with a steepness defined as that of the most critical wave in the probable sea conditions for which certification with ditching</p>

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			<p>provisions is requested by the applicant in the likely pitch, roll, and yaw attitudes that would reasonably be expected to occur in service; autorotation, run-on landing, or one-engine-inoperative flight tests, or validated simulation, as applicable, should be used to confirm the attitude selected.</p> <p>(ii) The wave is to be considered as a stationary body of water.</p> <p>(iii) The forward velocity relative to the wave surface should be in a range of 0–56 km/h (30 kt) with a vertical-descent rate of not less than 1.5 m/s (5 ft/s) relative to the mean wave surface. No account need be taken of the wave particle velocity.</p> <p>(iv) A rotor lift of not more than two-thirds of the design maximum weight may be used to act through the rotorcraft’s centre of gravity during water entry.</p> <p>(v) The above conditions may be simulated or tested using a calm horizontal water surface to give an equivalent impact normal velocity relative to the water surface.</p> <p>.....</p> <p>.....</p> <p>(b) Procedures</p> <p>(1) The rotorcraft support structure, structure-to-float attachments, and floats should be substantiated for rational limit and ultimate ditching loads.</p> <p>(2) The most severe sea conditions for which certification with ditching provisions is requested by the applicant are to be considered. The sea conditions should be selected in accordance with AMC 29.801(e).</p> <p>(3) The landing structural design consideration should be based on water entry with a rotor lift of not more than two-thirds of the maximum design weight acting through the rotorcraft’s centre of gravity under the following conditions:</p> <p>—— (i) forward velocities of 0–56 km/h (30 kt) relative to the mean wave surface;</p> <p>—— (ii) the rotorcraft pitch attitude that would reasonably be expected to occur in service; —— autorotation, run-on landing, or one-engine-inoperative flight tests, or validated simulation, as applicable, should be used to confirm the attitude selected;</p>

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			<p>_____ (iii) likely roll and yaw attitudes; and</p> <p>_____ (iv) vertical descent velocity of 1.5 m/s (5 ft/s) or greater relative to the mean wave surface.</p> <p>(4/3) Landing load factors and water load distribution may be determined by water drop tests or validated analysis.</p> <p>(5/4) Auxiliary or emergency float loads should be determined by full immersion or by the use of restoring moments required to compensate for upsetting moments caused by side wind, asymmetrical rotorcraft landing, water wave action, rotorcraft inertia, and probable structure damage and punctures considered under CS 29.801. Auxiliary or emergency float loads may be determined by tests or analysis based on tests.</p> <p>(6/5) Floats deployed after water entry are required to be substantiated by tests or analysis for the specified immersion loads (same as for (4) above and for the specified combined vertical and drag loads).</p>
7.	27.783	This wording used in this new paragraph is not consistent with the conversion to irregular wave certification. By definition of the irregular wave spectrum, there are “rogue waves”, so demonstrating that the doors will remain open and secure in the most severe sea conditions would be very difficult. The flotation requirements use a probabilistic approach in using irregular waves, this requirement does not.	Recommend clearer definition on “most severe sea condition” with respect to irregular wave spectrum.
8.	CS27 Cat A CS29.801 and AMC29.801	Post-capsize survivability features, taking account of breath-hold capability. Despite early egress and model feasibility studies which demonstrated the principle, the integration issues around this concept remain unproven and have not been formally demonstrated by any OEM. Only one float manufacturer seems to be attempting this (One Atmosphere - Australia), while other flotation system suppliers appear to remain unconvinced of the practicality. The intended benefits appear overstated, meanwhile it is clear that fuselage designs to accommodate such a system and meet the rules may need to be significantly different in future (size, height, seating capacity etc.). This will have a particularly disproportionate impact on Part27 Cat A designs. It is considered that if the perceived benefits are significant then the requirement should be market driven - i.e. specified by the operators in future contracts.	
9.	CS27.801 CS29.801	Auto Float Deployment...	Auto deployment is considered sensible and is already employed by many manufacturers. Auto-arm, however, may introduce additional hazards due to the possibility of inadvertent inflation at any point in the flight envelope - i.e. potentially

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			catastrophic. It is felt that this has not been properly considered and is especially disproportionate with regard to Part 27 rotorcraft.
10.	MG10 / CS27.801 (b) to (j) (Cat A)	Additional regulations for Cat A "ditching equipped" helicopter inserted. - Particularly relating to certification of an emergency flotation system alone. MG10 is replaced by more onerous requirements of CS27.801 (b) to (h) for non - Category A and CS29.801 (b) to (j) for Category A. This means both Cat A and non-Cat A types with EFS only will need to be tested for water entry behaviour and need to conform to the new flotation seaworthiness test requirements in irregular waves. Cat A aircraft with EFS only will additionally need to be able to demonstrate a "breath hold" mitigation iaw CS29.801 and also not sink following loss of a complete flotation unit. The new requirements are disproportionate for Part 27 rotorcraft, not recognising the limitations and needs of the small helicopter manufacturers and operators. Safety in casual overwater operations may be reduced due to owners choosing to operate non EFS fitted aircraft. Overall it is strongly considered that all the changes are heavily tailored to commercial overwater operations and are disproportionate for the normal Part 27 type of operation	
11.	27.801(c)(1)	The intent of the new provision is unclear. 27.563 already include the loads for ditching, so this would imply some other type of assessment?	Requirement should be reworded to clarify the intent and should not refer to water impact.
12.	27.801(c)(2)	Text is confusing. Intent is that the floats be automatically armed before water entry and not rely on pilots to arm the floats prior to water impact. The wording suggests that the floats must automatically arm when within the boundaries of the envelope defined for approved flight with floats ("restricted envelope"). Manual arming is in fact a required feature in order to meet the safety criteria for inadvertent float inflation. If automatically armed, this would expose a higher risk of inadvertent deployment throughout the restricted envelope which would result in a safety reduction. Ditching by definition is a deliberately executed emergency landing on water per the RFM procedures. Arming the floats is in the procedures. This is an attempt to address issues with water impact, and it is questionable whether or not automatic arming would solve it. If the helicopter is flown into (or enters) the water at a speed above the envelope limit, the floats would not be automatically armed.	Requirements should be simplified and less prescriptive. Is this requirement necessary? 801(c)(3) below states automatic deployment following water entry.
13.	27.801(d)	Testing of entry into water and sea conditions.	Need to establish a position

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		<p>Given that ditching is a deliberate emergency landing, it is expected to be controlled by the pilot to the extent possible during an autorotation touchdown. The requirement to conduct powered model testing of the entry is questionable; there is no way to control the flare and subsequent run on into the water in a model test. Further, the pilot flying the helicopter is going to aim for what he believes is the best spot to set the helicopter down, and again there is no way in a model test to simulate this. This requirement does not provide any valuable demonstration of the helicopter's capability to conduct a safe ditching water entry and should be removed give:</p> <ul style="list-style-type: none"> a. Each helicopter must demonstrate it's capability to execute a power off landing during certification; b. There has not been any problems with water entry for the ditchings on record (that I am aware of); c. Model testing of the helicopter's behavior on water entry is not representative of an actual controlled water entry. 	Recommend deleting the entire Requirement, or rewording it to show by analysis only.
14.	27.801(e)	<p>Probability of capsizing used to determine the amount of testing required is confusing and over complicated.</p> <p>The probabilistic approach proposed using the random generated spectrum suggests that the testing is going to be a "luck of the draw" occurrence. If a capsizing does occur, then an oceanographer can review the data and make a determination on whether or not the test is considered a pass or fail. This results in a somewhat subjective assessment, and is therefore by default something very difficult to design for. None of the OEMs in the WG were comfortable with the proposed approach.</p>	<p>Need to establish a position</p> <p>Recommend that a suitable "sample" spectrum be defined such that the test is pass or fail based on the actual model performance during the test. There are examples within the current regulations where assumed spectra are tested to be representative of in service use.</p>
15.	AMC27.801(e) AMC29.801(e) Irregular Wave Testing	Requires probabilistic demonstration. Helicopter model constrained side-on to waves	<p>The probabilistic approach and the need for a qualified oceanographer to interpret the tests and determine pass / fail is likely to be a source of confusion. It is not clear how easily EASA will be able to interpret certification evidence provided to them by different applicants.</p> <p>Side-on constraint is considered overly conservative and may be unrealistic. Some helicopter types "weather cock" head on to the waves even without headwind. The tank test spec should allow for this to be shown and then allow tethering to nose to give nose-on to wave constraint where applicable.</p>
16.	27.801(e)	Text referring to the jettisoning of fuel has been removed. The jettisoning of fuel will not add to the buoyancy of the helicopter, but will likely raise the helicopter's centre of gravity (CG), reducing stability, and may also create an additional hazard to occupants.	Complete agreement. This is an overdue change that removes a regulation deleterious to rotorcraft safety.

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17.	27.801(f)	Water pressures on doors and windows “probable pressures” is not definitive and would require consultation with oceanographers to come up with the probable pressures associated with certification to a significant wave height. It should be fairly easy to generate a table which would correlate the pressure with the significant wave height to ensure a level and clear design criteria.	No comment on water pressures on doors and windows Recommend adding a table of “probable pressure” values corresponding to 6 – 8 significant wave heights.
18.	27.801(g)	The requirement to add chevrons as part of a ditching configuration is not appropriate under the certification rules.	Requirements for specific paint schemes should be included in an amendment to the operating rules. This is similar to the operating rules for markings surrounding egress points.
19.	CS27.801(g) CS29.801(g)	Contrasting chevrons must be applied to fuselage under surface	This is a paint scheme issue and seems to have little to do with certification.
20.	27.801(h)	Sea conditions on the RFM Nit noid, but this actually should go into 27.1587 (or a new 27.158x)	No comment regarding sea conditions Move to correct Section of CS 27.
21.	CS29.803 (c) (1)	There must be "easy step in" possibility for life raft boarding	"It must be demonstrated" suggests a physical demonstration. Wording should be clarified to ensure that this can be "shown by design"
22.	CS27.805 CS29.805	Flight Crew exits must function well as ditching exits, including when capsized..."	It is not clear how this is to be demonstrated for jettisonable doors or windows above a certain size due to water pressure.
23.	AMC27.805 CS/AMC29.811	Flight Crew exits must have "HEELS"	What should trigger the illumination (e.g. crash switch/ immersion...?)
24.	27.805(c)	Flight Crew Exits	Provide clarity to the requirement
25.	AMC27.807 CS/AMC29.811	Passenger ditching exits must have "HEELS"means of opening must be provided with lighting	What should trigger the illumination (e.g. crash switch/ immersion...?) Lighting the means of opening is not always feasible
26.	27.807(a)(3)	The provision for ditching emergency exits to be completely above the waterline has been removed.	Agreement. Rotorcraft with “wet floors” do not need emergency exits to be completely above the waterline, since the water level inside the cabin might be at the same level as outside.

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27.	27.807(d)	<p>Passenger Emergency Exits</p> <p>Passenger emergency exits requirement means max 4 abreast seating in the cabin.</p>	<p>Need to establish a position</p> <p>Be less prescriptive in the requirement</p>
28.	27.807(d)(2)	Word “optimized” is too subjective	Change to: “Ditching emergency exits, including their means of operation, markings, lighting and accessibility, must be designed for use in a flooded and/or capsized cabin.”
29.	CS27.807 (d) (2) CS29.809(j)(1)	Passenger ditching exits must function well as ditching exits, including when capsized..."must be optimised for use in a flooded and capsized cabin."	Delete "The design of" and change "optimised for" to "designed for"
30.	27.1415	Operating regulation has been specified.	Change to refer to “operating rules” and not the specific regulation.
31.	CS29.1415	If more than one life raft is installed, they must be approximately equal in size and accommodate all occupants in one at overload	This is too prescriptive as occasionally, three or more life rafts may be fitted and for good reason they may be of different sizes (e.g. individual rafts for the crew).
32.	CS27.1415 CS29.1415	Remote raft deployment (from cockpit / cabin or outside the aircraft) reliably and with the helicopter in any attitude.	"It must be demonstrated" suggests a physical demonstration. Wording should be clarified to ensure that this can be "shown by design / inspection / analysis"
33.	27.1415(b)	Requirement is very prescriptive and will limit designs that have other means to ensure life rafts are deployed after water entry (i.e. automatic life raft deployment)	Requirement should be rewritten to consider other possibilities for the deployment of life rafts.
34.	27.1415(c)	<p>It is unclear if a physical demonstration is being requested.</p> <p>Just a subtle point, but I struggled with how to set the break strength of the lines – they must be strong enough to not break in rough weather (seas and winds), yet weak enough to break if the helicopter sinks. I asked this question during the WG meetings, but never received an answer. And, given that per the NPA the helicopter can't sink with it's most critical “float unit” removed, why do we need to have it break if the helicopter sinks?</p>	<p>Text should be revised to clarify the intent. The regulation should only identify the requirement to have a system that will ensure life rafts are deployed in any sea condition either automatically or manually by all occupants and not have an adjective to suggest a specific means to demonstrate compliance.</p> <p>Remove the requirement for the rope to break if the helicopter sinks, or provide some other specific criteria which identifies how this can be shown.</p>
35.	27.1470	Operating regulation has been specified.	Change to refer to “operating rules” and not the specific regulation.

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36.	CS27 Appendix C	<p>Adding the requirements from CS29 for ditching is not appropriate for CS27 Category A. If the intent is to cover North Sea wind farms, the operating rules for these types of operations should dictate what level of safety is expected rather than having the aircraft standards dictate the requirements.</p> <p>This change has the potential to eliminate CS27 Category A aircraft from obtaining ditching certification due to the feasibility of meeting these requirements in a small rotorcraft.</p> <p>The additional weight penalties associated with meeting these requirements are not sustainable for aircraft which are already weight restricted.</p> <p>The Category A requirements of CS 27 are intended to provide for engine isolation and single engine performance. They are not used to increase the level of safety for all aspects. If operators desire a higher level of safety they have the option to purchase CS29 rotorcraft for these types of operations.</p>	The level of safety of CS27 is not the same as CS29 (even for Category A). Remove the CS29 ditching requirements from CS27 Appendix C or consider removing the weight limit for CS27.
37.	AMC 27.563(a)(1)(i)	AMC material usually adds clarity to terms used in the regulations. This does not. The use of descriptors used in “most critical wave”, “probable sea condition”, and “likely pitch, roll and yaw attitudes” are not sufficiently specific with respect to irregular wave spectrums. As discussed previously, how is the most critical wave defined (rogue wave)? Same applies to probable sea conditions, and likely attitudes.	Recommend clarifying (quantifying) the descriptors used in the AMC.
38.	AMC 27.801(a)(1)	Deletion of “The rotorcraft is assumed to be intact prior to water entry with all controls and essential systems, except engines, functioning properly” from the existing ditching definition would suggest you could not assume this. If the aircraft was not intact with all essential systems functioning properly, then the result would likely be a water impact.	Delete this phrase from ditching definition.
39.	AMC 27.801(b)(4)	This expands on comment from above – suggesting ditching needs to include transmission failures, lightning strikes etc. You can not design – show successful ditching following these type failures / occurrences.	Clarification on the desired intent.
40.			
41.	AMC 27.801(b)(12)	Phrase “This is permissible, provided that the mean level of water in the cabin is limited to below seat cushion height” would appear inconsistent with the side floating concepts being put forward.	Delete phrase, or re-word to be consistent with other proposed floating solutions.
42.	AMC 27.801(b)(13)	Phrase “and are expected to become an operational limitation on normal operations” does not belong in the regulations. Suggesting an operational limitation in the design requirements is not appropriate.	Delete phrase.
43.	AMC 27.801(c)(2)(ii)	The material provides criteria for manual inflation. Is this in disagreement with the requirement for auto inflation?	Provide clarification of the intent

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44.	AMC 27.801(c)(2)(iii)	The guidance states must automatically de-arm for conditions where inadvertent inflation has not been shown to be non hazardous using parameters such as height and speed. For flight over land, these parameters will not be enough (i.e. Cat A departures / arrivals, H-V demonstrations etc.)	Provide clarification of the intent
45.	AMC 27.801(c)(4&5)	See comments on Regulation for water entry testing	Provide clarification of the intent
46.	AMC 27.801(c)(9)(iv)	Providing information in the RFM on attitude, speed etc is OK, but wave position does not belong in the RFM. This could get folks in trouble.	Delete wave position
47.	AMC 27.801(e)	Too complicated – see comments on Regulation above.	Clarify position
48.	AMC 27.805(a)	States exits should be designed for escape following a ditching or water impact. Can not design for water impact.	Delete water impact requirement.
49.	AMC 27.805(b)(3)	Likely damage...such as loss of tailboom. Suggests that tailbooms will fall off during ditching.	Re-word to state items that fail ditching structural analysis. Remove reference to tailboom.
50.	AMC 27 MG10 Page 63	The NPA hides the fact that all EFS would need to meet ditching requirements. AMC 27 MG10 is revised to require meeting the ditching requirements of 27.563 and 27.801(b) to (h). For CS-27 this means needing to meet the structural and ditching requirements for a simple EFS. It is feasible that kits and STCs will not be able to be developed at a low cost and will therefore not be available and result in safety equipment not being available for small aircraft or private operators who only occasionally fly over water. A low cost, simple alternative must be made available.	See previous recommendation about using a safety continuum model whereby there would be scalable requirements which would allow for allow for simple flotation safety equipment.
51.	AMC 27 MG10 Page 63	The text added to MG-10 which replaces the existing MG-10 is imposing certification requirements through Advisory Material: “Regulation (EU) No 965/2012 may allow for the installation of only emergency flotation equipment, rather than certification for full ditching provisions. However, the provisions for certification of the emergency flotation equipment in such a case remain the same as those for full ditching certification, i.e. compliance with the ditching provisions of CS 27.563 and CS 27.801(b) to (h) should be shown.”	The applicable requirements for non-ditching applications need to be addressed in CS-27 and not in advisory material. Furthermore, see previous comments, requirements for simple floatation systems should not have to meet the requirements of 27.863 and 27.801.
52.	29.563 29.563(a)	Structural ditching provisions The requirement states for the most critical wave. This is inconsistent for irregular waves – i.e. rogue wave?	Needs to be reviewed for impact The requirement needs re-wording
53.	29.801(c)(1)	The intent of the new provision is unclear. 29.563 already includes the loads for ditching, so this would imply some other type of assessment?	Requirement should be reworded to clarify the intent. i.e.: “be designed to minimize the possibility of damage due to water impact.”

Reference #	Page or Paragraph	Comment	Recommendation
54.	29.801(c)(2)	<p>Text is confusing. Intent is that the floats be automatically armed before water entry and not rely on pilots to arm the floats prior to water impact.</p> <p>The wording suggests that the floats must automatically arm when within the boundaries of the envelope defined for approved flight with floats (“restricted envelope”). Manual arming is in fact a required feature in order to meet the safety criteria for inadvertent float inflation. If automatically armed, this would expose a higher risk of inadvertent deployment throughout the restricted envelope which would result in a safety reduction.</p> <p>Ditching by definition is a deliberately executed emergency landing on water per the RFM procedures. Arming the floats is in the procedures. This is an attempt to address issues with water impact, and it is questionable whether or not automatic arming would solve it. If the helicopter is flown into (or enters) the water at a speed above the envelope limit, the floats would not be automatically armed.</p>	<p>Requirements should be simplified and less prescriptive. i.e.: have an automatic means of arming prior to water entry.</p> <p>Is this requirement necessary? 801(c)(3) below states automatic deployment following water impact.</p>
55.	29.801(d)	<p>Testing of entry into water and sea conditions.</p> <p>Given that ditching is a deliberate emergency landing, it is expected to be controlled by the pilot to the extent possible during an autorotation touchdown. The requirement to conduct powered model testing of the entry is questionable, there is no way to control the flare and subsequent run on into the water in a model test. Further, the pilot flying the helicopter is going to aim for what he believes is the best spot to set the helicopter down, and again there is no way in a model test to simulate this. This requirement does not provide any valuable demonstration of the helicopter’s capability to conduct a safe ditching water entry and should be removed give:</p> <ul style="list-style-type: none">a. Each helicopter must demonstrate it’s capability to execute a power off landing during certification;b. There has not been any problems with water entry for the ditchings on record (that I am aware of);c. Model testing of the helicoter’s behavior on water entry is not representative of an actual controlled water entry.	<p>Need to establish a position</p> <p>Recommend deleting the entire Requirement, or rewording it to show by analysis only.</p>

Reference #	Page or Paragraph	Comment	Recommendation
56.	29.801(e)	<p>Probability of capsize used to determine the amount of testing required is confusing and over complicated.</p> <p>The probabilistic approach proposed using the random generated spectrum suggests that the testing is going to be a “luck of the draw” occurrence. If a capsize does occur, then an oceanographer can review the data and make a determination on whether or not the test is considered a pass or fail. This results in a somewhat subjective assessment, and is therefore by default something very difficult to design for. None of the OEMs in the WG were comfortable with the proposed approach.</p>	<p>Need to establish a position</p> <p>Recommend that a suitable “sample” spectrum be defined such that the test is pass or fail based on the actual model performance during the test. There are examples within the current regulations where assumed spectra are tested to be representative of in service use.</p>
57.	29.801(e)	Text referring to the jettisoning of fuel has been removed. The jettisoning of fuel will not add to the buoyancy of the rotorcraft, but will likely raise the helicopter’s CG, reducing stability, and may also create an additional hazard to occupants.	Complete agreement. This is an overdue change that removes a regulation deleterious to rotorcraft safety.
58.	29.801(f)	<p>Water pressures on doors and windows</p> <p>“probable pressures” is not definitive and would require consultation with oceanographers to come up with the probable pressures associated with certification to a significant wave height. It should be fairly easy to generate a table which would correlate the pressure with the significant wave height to ensure a level and clearly design criteria.</p>	<p>No comment</p> <p>Recommend adding a table of “probable pressure” values corresponding to 6 – 8 significant wave heights.</p>
59.	29.801(g)	The requirement to add chevrons as part of a ditching configuration is not appropriate under the certification rules.	Requirements for specific pain schemes should be included in an amendment to the operating rules. This is similar to the operating rules for markings surrounding egress points.
60.	29.801(h)	<p>Sea conditions on the RFM</p> <p>‘Nit noid’, but this actually should go into 29.1587 (or a new 29.158x)</p>	<p>No comment</p> <p>Move to correct Section of CS 29.</p>
61.			

Reference #	Page or Paragraph	Comment	Recommendation
62.	29.801(i)	The requirement hides the need to have a float configuration that will always maintain part of the aircraft out of the water for any EFS systems (ditching or not)	Bell considers these items to be low technical maturity for unproven safety benefits and recommends that the industry establishes a position considering: <ul style="list-style-type: none"> • Feasibility, maturity of side float concept • Additional side float hazards • Effect of side floats on engines and performance • Development costs vs safety benefits • Feasibility and impact of configurations for CS-27 Cat A and smaller CS-29
63.	29.803(c)	Requirement is to demonstrate egress to a life raft. The can be interpreted as needing to test in all sea conditions egress to a life raft. If this is not the intent the requirement should be changed to reflect the real intent. “without first entering the water” is inconsistent with the other Regulations within the NPA.	Requirement should be reworded to remove “demonstrate”. i.e.: passengers must be able to evacuate the rotorcraft and step directly into any of the required life rafts, without first entering the water following a ditching in all sea conditions for which ditching capability is requested by the applicant, “without first entering the water” should be deleted.
64.	29.805(c)	Flight Crew Exits	Need to establish a position
65.	29.807(d)(1)	The provision for ditching emergency exits to be completely above the waterline has been removed.	Agreement. Rotorcraft with “wet floors” do not need emergency exits to be completely above the waterline, since the water level inside the cabin might be at the same level as outside.
66.	29.809(j)	Emergency Exit Arrangement	Need to establish a position
67.	29.809(j)(1)	Word “optimized” is too subjective	Change to: “Ditching emergency exits, including their means of operation, markings, lighting and accessibility, must be designed for use in a flooded and/or capsized cabin.”
68.	29.809(j)(2)	Subtle point here - capsized with any door in the open and locked position – means that emergency windows in doors must align with other cabin emergency windows when the door is open and locked. This is overkill if the door is not to be used as an emergency exit.	Need to establish a position
69.	29.813(d)	Text is prescribing “handholds”	Test could be made less prescriptive by changing text to: “a means must be provided to assist with cross cabin egress”
70.	29.1415	Operating regulation has been specified.	Change to refer to “operating rules” and not the specific regulation.

Reference #	Page or Paragraph	Comment	Recommendation
71.	29.1415(b)	Requirement is very prescriptive and will limit designs that have other means to ensure life rafts are deployed after water entry (i.e. automatic life raft deployment)	Requirement should be rewritten to consider other possibilities for the deployment of life rafts.
72.	29.1415(b)	It is unclear if a physical demonstration is being requested.	Text should be revised to clarify the intent. The regulation should only identify the requirement to have a system that will ensure life rafts are deployed in any sea condition either automatically or manually by all occupants and not have an adjective to suggest a specific means to demonstrate compliance.
73.	29.1470	Operating regulation has been specified.	Change to refer to “operating rules” and not the specific regulation.
74.	AMC 29.563(a)(1)(i)	AMC material usually adds clarity to terms used in the regulations. This does not. The use of descriptors used in “most critical wave”, “probable sea condition”, and “likely pitch, roll and yaw attitudes” are not sufficiently specific with respect to irregular wave spectrums. As discussed previously, how is the most critical wave defined (rogue wave)? Same applies to probable sea conditions, and likely attitudes.	Recommend clarifying (quantifying) the descriptors used in the AMC.
75.	AMC 29.801(a)(1)	Deletion of “The rotorcraft is assumed to be intact prior to water entry with all controls and essential systems, except engines, functioning properly” from the existing ditching definition would suggest you could not assume this. If the aircraft was not intact with all essential systems functioning properly, then the result would likely be a water impact.	Delete this phrase from ditching definition.
76.	AMC 29.801(b)(4)	This expands on comment from above – suggesting ditching needs to include transmission failures, lightning strikes etc. You can not design – show successful ditching following these type failures / occurrences.	Clarification of position requested.
77.	AMC 29.801(b)(12)	Phrase “This is permissible, provided that the mean level of water in the cabin is limited to below seat cushion height” would appear inconsistent with the side floating concepts being put forward.	Delete phrase, or re-word to be consistent with other proposed floating solutions.
78.	AMC 29.801(b)(13)	This paragraph tries to justify the requirement for both stability model testing and post capsized survivability – you should not need both. It states this is really required for survivable water impacts.	Need to define position – challenge for designing for water impacts?
79.	AMC 29.801(b)(14)	Again, this paragraph refers to the requirement for water impact.	Need to define position – challenge for designing for water impacts?
80.	AMC 29.801(b)(15)	Phrase “and are expected to become an operational limitation on normal operations” does not belong in the regulations. Suggesting an operational limitation in the design requirements is not appropriate.	Delete phrase.
81.	AMC 29.801(c)(2)(ii)	Again refers to water impact.	Clarify

Reference #	Page or Paragraph	Comment	Recommendation
82.	AMC 29.801(c)(2)(iv)	The material provides criteria for manual inflation. Is this in disagreement with the requirement for auto inflation?	Clarify
83.	AMC 29.801(c)(2)(v)	The guidance states must automatically de-arm for conditions where inadvertent inflation has not been shown to be non hazardous using parameters such as height and speed. For flight over land, these parameters will not be enough (i.e. Cat A departures / arrivals, H-V demonstrations etc.)	Clarify
84.	AMC 29.801(c)(5&6)	See comments on Regulation for water entry testing	Clarify Position
85.	AMC 29.801(c)(8)	Too prescriptive on air pockets??	Bell believes there may be other means to comply
86.	AMC 29.801(c)(12)(i v)	Providing information in the RFM on attitude, speed etc is OK, but wave position does not belong in the RFM. This could get folks in trouble.	Delete wave position
87.	AMC 29.801(e)	Too complicated – see comments on Regulation above.	Clarify position
88.	AMC 29.803(c)	“egress with a very low risk of water entry” is inconsistent with the proposed regulations.	Clarify wording.
89.	AMC 29.805(a)	States exits should be designed for escape following a ditching or water impact. Can not design for water impact.	Delete water impact.
90.	AMC 29.805(b)(3)	Likely damage...such as loss of tailboom. Suggests that tailbooms will fall off during ditching. Should be reworded to state items that fail ditching structural analysis.	Re-word. Remove reference to tailboom.
91.	AMC 29.813(a)	Again, refers to survivable water impact. Can not design for this. There is also an inconsistency with the explanation and the other regulations. i.e. if an air pocket is provided then breath hold time, immediate egress etc are not as critical as defined here.	Clarify position
92.	AMC 29 MG10 Page 109	The NPA hides the fact that all EFS would need to meet ditching requirements. AMC 29 MG10 is revised to require meeting the ditching requirements of 29.563 and 29.801(b) to (j). This means needing to meet structural and ditching requirements for all EFS (including capsized requirements). It is feasible that kits and STCs will not be able to be developed at a low cost and will therefore not be available and result in safety equipment not being available for small aircraft or private operators who only occasionally fly over water. A low cost, simple alternative must be made available.	See previous recommendation about using a safety continuum model whereby there would be scalable requirements which would allow for allow for simple flotation safety equipment.

Reference #	Page or Paragraph	Comment	Recommendation
93.	AMC 29 MG10 Page 109	<p>The text added to MG-10 which replaces the existing MG-10 is imposing certification requirements through Advisory Material:</p> <p>“Regulation (EU) No 965/2012 may allow for the installation of only emergency flotation equipment, rather than certification for full ditching provisions. However, the provisions for certification of the emergency flotation equipment in such a case remain the same as those for full ditching certification, i.e. compliance with the ditching provisions of CS 29.563 and CS 29.801(b) to (j) should be shown.”</p>	<p>The applicable requirements for non-ditching applications need to be addressed in CS-29 and not in advisory material. Furthermore, see previous comments, requirements for simple floatation systems should not have to meet the requirements of 29.863 and 29.801.</p>