**Tabela de diferenças entre emendas e justificativas**

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| 29.571 |  | Justificativa |
| RBAC 29 Emenda 54 e 54A | RBAC 29 Emenda 55 e 55A |
| **29.571 Fatigue evaluation of [structure.]**  [(a) General. An evaluation of the strength of principal elements, detail design points, and fabrication techniques must show that catastrophic failure due to fatigue, considering the effects of environment, intrinsic/discrete flaws, or accidental damage will be avoided. Parts to be evaluated include, but are not limited to, rotors, rotor drive systems between the engines and rotor hubs, controls, fuselage, fixed and movable control surfaces, engine and transmission mountings, landing gear, and their related primary attachments. In addition, the following apply:  (1) Each evaluation required by this section must include--  (i) The identification of principal structural elements, the failure of which could result in catastrophic failure of the rotorcraft;  (ii) In-flight measurement in determining the loads or stresses for items in paragraph (a)(1)(i) of this section in all critical conditions throughout the range of limitations in Sec. 29.309 (including altitude effects), except that maneuvering load factors need not exceed the maximum values expected in operations; and  (iii) Loading spectra as severe as those expected in operation based on loads or stresses determined under paragraph (a)(1)(ii) of this section, including external load operations, if applicable, and other high frequency power cycle operations.  (2) Based on the evaluations required by this section, inspections, replacement times, combinations thereof, or other procedures must be established as necessary to avoid catastrophic failure. These inspections, replacement times, combinations thereof, or other procedures must be included in the airworthiness limitations section of the Instructions for Continued Airworthiness required by Sec. 29.1529 and Section A29.4 of Appendix A of this part.  (b) Fatigue tolerance evaluation (including tolerance to flaws). The structure must be shown by analysis supported by test evidence and, if available, service experience to be of fatigue tolerant design. The fatigue tolerance evaluation must include the requirements of either paragraph (b)(1), (2), or (3) of this section, or a combination thereof, and also must include a determination of the probable locations and modes of damage caused by fatigue, considering environmental effects, intrinsic/discrete flaws, or accidental damage. Compliance with the flaw tolerance requirements of paragraph (b)(1) or (2) of this section is required unless the applicant establishes that these fatigue flaw tolerant methods for a particular structure cannot be achieved within the limitations of geometry, inspectability, or good design practice. Under these circumstances, the safe-life evaluation of paragraph (b)(3) of this section is required.  (1) Flaw tolerant safe-life evaluation. It must be shown that the structure, with flaws present, is able to withstand repeated loads of variable magnitude without detectable flaw growth for the following time intervals--  (i) Life of the rotorcraft; or  (ii) Within a replacement time furnished under Section A29.4 of Appendix A to this part.  (2) Fail-safe (residual strength after flaw growth) evaluation. It must be shown that the structure remaining after a partial failure is able to withstand design limit loads without failure within an inspection period furnished under Section A29.4 of Appendix A to this part. Limit loads are defined in Sec. 29.301(a).  (i) The residual strength evaluation must show that the remaining structure after flaw growth is able to withstand design limit loads without failure within its operational life.  (ii) Inspection intervals and methods must be established as necessary to ensure that failures are detected prior to residual strength conditions being reached.  (iii) If significant changes in structural stiffness or geometry, or both, follow from a structural failure or partial failure, the effect on flaw tolerance must be further investigated.  (3) Safe-life evaluation. It must be shown that the structure is able to withstand repeated loads of variable magnitude without detectable cracks for the following time intervals--  (i) Life of the rotorcraft; or  (ii) Within a replacement time furnished under Section A29.4 of Appendix A to this part.]  Amdt. 29-28, Eff. 11/27/89  Final Rule. Docket No. 23485; Issued on 10/23/89. | **29.571 Fatigue Tolerance Evaluation of Metallic Structure.**  (a) A fatigue tolerance evaluation of each principal structural element (PSE) must be performed, and appropriate inspections and retirement time or approved equivalent means must be established to avoid catastrophic failure during the operational life of the rotorcraft. The fatigue tolerance evaluation must consider the effects of both fatigue and the damage determined under paragraph (e)(4) of this section. Parts to be evaluated include PSEs of the rotors, rotor drive systems between the engines and rotor hubs, controls, fuselage, fixed and movable control surfaces, engine and transmission mountings, landing gear, and their related primary attachments.  (b) For the purposes of this section, the term—  (1) Catastrophic failure means an event that could prevent continued safe flight and landing.  (2) Principal structural element (PSE) means a structural element that contributes significantly to the carriage of flight or ground loads, and the fatigue failure of that structural element could result in catastrophic failure of the aircraft.  (c) The methodology used to establish compliance with this section must be submitted to and approved by the Administrator.  (d) Considering all rotorcraft structure, structural elements, and assemblies, each PSE must be identified.  (e) Each fatigue tolerance evaluation required by this section must include:  (1) In-flight measurements to determine the fatigue loads or stresses for the PSEs identified in paragraph (d) of this section in all critical conditions throughout the range of design limitations required by §29.309 (including altitude effects), except that maneuvering load factors need not exceed the maximum values expected in operations.  (2) The loading spectra as severe as those expected in operations based on loads or stresses determined under paragraph (e)(1) of this section, including external load operations, if applicable, and other high frequency power-cycle operations.  (3) Takeoff, landing, and taxi loads when evaluating the landing gear and other affected PSEs.  (4) For each PSE identified in paragraph (d) of this section, a threat assessment which includes a determination of the probable locations, types, and sizes of damage, taking into account fatigue, environmental effects, intrinsic and discrete flaws, or accidental damage that may occur during manufacture or operation.  (5) A determination of the fatigue tolerance characteristics for the PSE with the damage identified in paragraph (e)(4) of this section that supports the inspection and retirement times, or other approved equivalent means.  (6) Analyses supported by test evidence and, if available, service experience.  (f) A residual strength determination is required that substantiates the maximum damage size assumed in the fatigue tolerance evaluation. In determining inspection intervals based on damage growth, the residual strength evaluation must show that the remaining structure, after damage growth, is able to withstand design limit loads without failure.  (g) The effect of damage on stiffness, dynamic behavior, loads, and functional performance must be considered.  (h) Based on the requirements of this section, inspections and retirement times or approved equivalent means must be established to avoid catastrophic failure. The inspections and retirement times or approved equivalent means must be included in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness required by Section 29.1529 and Section A29.4 of Appendix A of this part.  (i) If inspections for any of the damage types identified in paragraph (e)(4) of this section cannot be established within the limitations of geometry, inspectability, or good design practice, then supplemental procedures, in conjunction with the PSE retirement time, must be established to minimize the risk of occurrence of these types of damage that could result in a catastrophic failure during the operational life of the rotorcraft.  [Doc. No. FAA-2009-0413, Amdt. 29-55, 76 FR 75442, Dec. 2, 2011] | A adoção desta regra elimina as diferenças regulamentares entre os padrões de aeronavegabilidade do Brasil (ANAC), da Federal Aviation Administration (FAA) e da Agência Europeia para a Segurança da Aviação (EASA), visando, portanto, sua harmonização, sem afetar as práticas atuais de projeto do setor.  Esta emenda 29-55 revisa os requisitos de avaliação da tolerância à fadiga de estruturas metálicas a fim de tornar o regulamento menos prescritivo e mais baseado em desempenho. Para atingir este objetivo, todo o seu conteúdo foi reescrito. A indústria utiliza vários métodos de avaliação da tolerância à fadiga e todos eles têm o seu mérito e podem ser efetivos, dependendo da especificidade de cada tipo de dano sob avaliação. Em vez de prescrever métodos específicos, como ocorre atualmente, o regulamento revisado define objetivos específicos a serem atingidos pela avaliação da tolerância ao dano, a saber, a determinação de inspeções e de prazos de retirada de serviço da estrutura – ou outro meio equivalente aprovado pela ANAC – a fim de evitar a falha catastrófica. Isso deve ser feito considerando as possíveis ameaças (fontes de danos) à integridade da estrutura. Foi incluída, também, a exigência de aprovação pela ANAC do método utilizado pelo fabricante.  Adicionalmente, sabe-se que para determinados tipos de danos nem sempre é possível estabelecer uma inspeção efetiva. O regulamento revisado provê, então, a possibilidade de não utilização de inspeções, podendo ser utilizado algum outro procedimento.  O requisito revisado especifica que devem ser consideradas as cargas de decolagem, pouso e taxiamento quando da avaliação do trem de pouso e de outras estruturas primárias afetadas por elas. |