**Tabela de diferenças entre emendas e justificativas**

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| **29.573** |  | **Justificativa** |
| **RBAC 29 Emenda 29-53** | **RBAC 29 emenda 29-54 e 54A** |  |
| **Inglês** | **Inglês** |  |
| [Não existente] | **29.573   Damage Tolerance and Fatigue Evaluation of Composite Rotorcraft Structures.**  (a) Each applicant must evaluate the composite rotorcraft structure under the damage tolerance standards of paragraph (d) of this section unless the applicant establishes that a damage tolerance evaluation is impractical within the limits of geometry, inspectability, and good design practice. If an applicant establishes that it is impractical within the limits of geometry, inspectability, and good design practice, the applicant must do a fatigue evaluation in accordance with paragraph (e) of this section.  (b) The methodology used to establish compliance with this section must be submitted to and approved by the Administrator.  (c) Definitions:  (1) *Catastrophic failure* is an event that could prevent continued safe flight and landing.  (2) *Principal Structural Elements (PSEs)* are structural elements that contribute significantly to the carrying of flight or ground loads, the failure of which could result in catastrophic failure of the rotorcraft.  (3) *Threat Assessment* is an assessment that specifies the locations, types, and sizes of damage, considering fatigue, environmental effects, intrinsic and discrete flaws, and impact or other accidental damage (including the discrete source of the accidental damage) that may occur during manufacture or operation.  (d) Damage Tolerance Evaluation:  (1) Each applicant must show that catastrophic failure due to static and fatigue loads, considering the intrinsic or discrete manufacturing defects or accidental damage, is avoided throughout the operational life or prescribed inspection intervals of the rotorcraft by performing damage tolerance evaluations of the strength of composite PSEs and other parts, detail design points, and fabrication techniques. Each applicant must account for the effects of material and process variability along with environmental conditions in the strength and fatigue evaluations.  Each applicant must evaluate parts that include PSEs of the airframe, main and tail rotor drive systems, main and tail rotor blades and hubs, rotor controls, fixed and movable control surfaces, engine and transmission mountings, landing gear, other parts, detail design points, and fabrication techniques deemed critical by the FAA. Each damage tolerance evaluation must include:  (i) The identification of all PSEs;  (ii) In-flight and ground measurements for determining the loads or stresses for all PSEs for all critical conditions throughout the range of limits in §29.309 (including altitude effects), except that maneuvering load factors need not exceed the maximum values expected in service;  (iii) The loading spectra as severe as those expected in service based on loads or stresses determined under paragraph (d)(1)(ii) of this section, including external load operations, if applicable, and other operations including high-torque events;  (iv) A threat assessment for all PSEs that specifies the locations, types, and sizes of damage, considering fatigue, environmental effects, intrinsic and discrete flaws, and impact or other accidental damage (including the discrete source of the accidental damage) that may occur during manufacture or operation; and  (v) An assessment of the residual strength and fatigue characteristics of all PSEs that supports the replacement times and inspection intervals established under paragraph (d)(2) of this section.  (2) Each applicant must establish replacement times, inspections, or other procedures for all PSEs to require the repair or replacement of damaged parts before a catastrophic failure. These replacement times, inspections, or other procedures must be included in the Airworthiness Limitations Section of the Instructions for Continued Airworthiness required by §29.1529.  (i) Replacement times for PSEs must be determined by tests, or by analysis supported by tests, and must show that the structure is able to withstand the repeated loads of variable magnitude expected in-service. In establishing these replacement times, the following items must be considered:  (A) Damage identified in the threat assessment required by paragraph (d)(1)(iv) of this section;  (B) Maximum acceptable manufacturing defects and in-service damage (*i.e.*, those that do not lower the residual strength below ultimate design loads and those that can be repaired to restore ultimate strength); and  (C) Ultimate load strength capability after applying repeated loads.  (ii) Inspection intervals for PSEs must be established to reveal any damage identified in the threat assessment required by paragraph (d)(1)(iv) of this section that may occur from fatigue or other in-service causes before such damage has grown to the extent that the component cannot sustain the required residual strength capability. In establishing these inspection intervals, the following items must be considered:  (A) The growth rate, including no-growth, of the damage under the repeated loads expected in-service determined by tests or analysis supported by tests;  (B) The required residual strength for the assumed damage established after considering the damage type, inspection interval, detectability of damage, and the techniques adopted for damage detection. The minimum required residual strength is limit load; and  (C) Whether the inspection will detect the damage growth before the minimum residual strength is reached and restored to ultimate load capability, or whether the component will require replacement.  (3) Each applicant must consider the effects of damage on stiffness, dynamic behavior, loads, and functional performance on all PSEs when substantiating the maximum assumed damage size and inspection interval.  (e) Fatigue Evaluation: If an applicant establishes that the damage tolerance evaluation described in paragraph (d) of this section is impractical within the limits of geometry, inspectability, or good design practice, the applicant must do a fatigue evaluation of the particular composite rotorcraft structure and:  (1) Identify all PSEs considered in the fatigue evaluation;  (2) Identify the types of damage for all PSEs considered in the fatigue evaluation;  (3) Establish supplemental procedures to minimize the risk of catastrophic failure associated with the damages identified in paragraph (d) of this section; and  (4) Include these supplemental procedures in the Airworthiness Limitations section of the Instructions for Continued Airworthiness required by §29.1529.  [Doc. No. FAA-2009-0660, Amdt. 29-59, 76 FR 74664, Dec. 1, 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 regra revisa padrões de aeronavegabilidade dos requisitos de certificação de tipo de aeronaves de asas rotativas nas categorias normal e de transporte.  Estruturas em compósitos apresentam comportamentos de material únicos e reagem diferentemente de estruturas metálicas a condições de danos e carregamentos. Esta regra endereça as características únicas de materiais compósitos e requer que requerentes avaliem estes materiais de maneira diferente daqueles materiais metálicos tradicionais.  Esta regra requer avaliações de tolerância ao dano e fadiga de estruturas em compósitos de modo a prevenir a redução da resistência estrutural de aeronaves de asas rotativas. Em estruturas em compósitos, fadiga de baixo ciclo frequentemente produz crescimento mínimo do dano, enquanto o dano acidental proveniente de impacto pode imediatamente reduzir a resistência estrutural residual. Isto é diferente em metais, onde qualquer dano crítico para a estrutura é sensível a cargas cíclicas de fadiga.  Esta mudança de regra também endereça a variabilidade de materiais e processos, bem como efeitos ambientais. O requisito de resistência para cargas finais será aplicado quando defeitos de fabricação e danos de serviço máximos aceitáveis estão presentes. Contudo, essa mudança de regra fornece uma exceção aos requisitos para a avaliação de tolerância ao dano, se o requerente puder demonstrar que a avaliação de tolerância ao dano é impraticável dentro dos limites de geometria, capacidade de inspeção e boas práticas de projeto. Nesse caso, pode ser permitido ao requerente realizar uma avaliação de fadiga em algumas estruturas da aeronave de asas rotativas com cenários de danos baseados em procedimentos suplementares, tal como estabelecendo tempo de substituição. Sob esta exceção, um requerente poderia demonstrar que certos danos não crescem ou não crescem além de certo limite ou tamanho, e que a estrutura danificada poderia ainda suportar carga final. Neste caso, uma inspeção pode não ser necessária e poderia ser atribuída à estrutura uma vida para substituição ao invés de um requerido programa de inspeção. Posteriormente, esta regra requer que o requerente conduza uma avaliação de ameaça, a qual está associada com o histórico em serviço de estruturas em compósitos. |

**Apêndice A; A29.4**

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| A.29.4 |  | Justificativa |
| Emenda 29-53 | Emenda 29-54 |
|  | Inglês |  |
| **a29.4 Airworthiness Limitations Section**  The Instructions for Continued Airworthiness must contain a section titled Airworthiness Limitations that is segregated and clearly distinguishable from the rest of the document. This section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure approved under §29.571. If the Instructions for Continued Airworthiness consist of multiple documents, the section required by this paragraph must be included in the principal manual. This section must contain a legible statement in a prominent location that reads: “The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.”  [Amdt. 29–20, 45 FR 60178, Sept 11, 1980, as amended by Amdt. 29–27, 54 FR 34330, Aug. 18, 1989] | **a29.4 Airworthiness Limitations Section**  The Instructions for Continued Airworthiness must contain a section titled Airworthiness Limitations that is segregated and clearly distinguishable from the rest of the document. This section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure required for type certification. If the Instructions for Continued Airworthiness consist of multiple documents, the section required by this paragraph must be included in the principal manual. This section must contain a legible statement in a prominent location that reads: “The Airworthiness Limitations section is FAA approved and specifies maintenance required under sections 43.16 of RBAC 43 and 91.403 of RBAC 91 unless an alternative program has been FAA approved.”  [Amdt. 29-20, 45 FR 60178, Sept. 11, 1980, as amended by Amdt. 29-27, 54 FR 34330, Aug. 18, 1989; Amdt. 29-54, 76 FR 74664, Dec. 1, 2011] | A seção a29.4 do apêndice A ao RBAC 29 está sendo revisada para eliminar a referência específica à seção 29.571 do RBAC 29, expandindo o escopo ao que seja necessário para certificação de tipo, bem como para adaptar ao contexto brasileiro as referências à autoridade de aviação civil e ao regulamento referenciado. |