Tabela de diferenças entre emendas e justificativas Emenda 137 para 139

25.307		Justificativa
RBAC Emenda 25-138	**RBAC Emenda 25-139**	O item (a) atualmente requer a realização de ensaio de resistência estrutural, a menos que o requerente demonstre que a análise isoladamente é confiável. O item (a) foi revisado para esclarecer os níveis de carga requeridos para ensaios, quando estes forem considerados necessários. Esta revisão também visa a harmonizar o texto com a FAA e a EASA. Os itens (b), (c) e (d) não sofreram revisão.
25.307 Proof of structure. (a) Compliance with the strength and deformation requirements of this subpart must be shown for each critical loading condition. Structural analysis may be used only if the structure conforms to those for which experience has shown this method to be reliable. **The Administrator may require ultimate load tests in cases where limit load tests may be inadequate.** …	25.307 Proof of structure. (a) Compliance with the strength and deformation requirements of this subpart must be shown for each critical loading condition. Structural analysis may be used only if the structure conforms to that for which experience has shown this method to be reliable. In other cases, substantiating tests must be made to load levels that are sufficient to verify structural behavior up to loads specified in § 25.305. …	

25.621		Justificativa
RBAC 25 Emenda 25-138	**RBAC 25 Emenda 25-139**	
§ 25.621 Casting factors. (a) General. The factors, tests, and inspections specified in paragraphs (b) through (d) of this section must be applied in addition to those necessary to establish foundry quality control. The inspections must meet approved specifications. Paragraphs (c) and (d) of this section apply to any structural castings except castings that are pressure tested as parts of hydraulic or other fluid systems and do not support structural loads.	**25.621 Casting factors.** (a) General. For castings used in structural applications, the factors, tests, and inspections specified in paragraphs (b) through (d) of this section must be applied in addition to those necessary to establish foundry quality control. The inspections must meet approved specifications. Paragraphs (c) and (d) of this section apply to any structural castings, except castings that are pressure tested as parts of hydraulic or other fluid systems and do not support structural loads.	A Seção 25.621, "Casting factors," foi revisada pela FAA, atendendo recomendação de Grupo de Trabalho, para: 1. tornar mais claro os requisitos de controle de qualidade, inspeção e ensaios, para peças fundidas críticas e não críticas. 2. Harmonização com EASA. Todo requisito foi reescrito visando os objetivos acima. Em termos técnicos, em comparação com a emenda anterior, agora é permitido fator de fundição de 1,0 para peças fundidas críticas, vide (c)(1). Foi emitida também, conjuntamente com a emenda, a AC 25.621-1, que provê material orientativo, inclusive sobre o processo necessário para o fator de fundição de 1,0 para peças fundidas críticas. Fonte: https://www.federalregister.gov/documents/2014/10/02/2014-

(b) Bearing stresses and surfaces. The casting factors specified in paragraphs (c) and (d) of this section— (1) Need not exceed 1.25 with respect to bearing stresses regardless of the method of inspection used; and (2) Need not be used with respect to the bearing surfaces of a part whose bearing factor is larger than the applicable casting factor. (c) Critical castings. For each casting whose failure would preclude continued safe flight and landing of the airplane or result in serious injury to occupants, the following apply: (1) Each critical casting must— (i) Have a casting factor of not less than 1.25; and (ii) Receive 100 percent inspection by visual, radiographic, and magnetic particle or penetrant inspection methods or approved equivalent nondestructive inspection methods. (2) For each critical casting with a casting factor less than 1.50, three sample	(b) Bearing stresses and surfaces. The casting factors specified in paragraphs(c) and(d) of this section— (1) Need not exceed 1.25 with respect to bearing stresses regardless of the method of inspection used; and (2) Need not be used with respect to the bearing surfaces of a part whose bearing factor is larger than the applicable casting factor. (c) Critical castings. Each casting whose failure could preclude continued safe flight and landing of the airplane or could result in serious injury to occupants is a critical casting. Each critical casting must have a factor associated with it for showing compliance with strength and deformation requirements of § 25.305, and must comply with the following criteria associated with that factor: (1) A casting factor of 1.0 or greater may be used, provided that— (i) It is demonstrated, in the form of process qualification, proof of product, and process monitoring that, for each casting design and part number, the castings produced by each foundry and process combination have coefficients	23373/harmonization-of-airworthiness-standards-miscellaneous-structures-requirements

castings must be static tested and shown to meet— (i) The strength requirements of §25.305 at an ultimate load corresponding to a casting factor of 1.25; and (ii) The deformation requirements of §25.305 at a load of 1.15 times the limit load. (3) Examples of these castings are structural attachment fittings, parts of flight control systems, control surface hinges and balance weight attachments, seat, berth, safety belt, and fuel and oil tank supports and attachments, and cabin pressure valves. (d) Noncritical castings. For each casting other than those specified in paragraph (c) of this section, the following apply: (1) Except as provided in paragraphs (d)(2) and (3) of this section, the casting factors and corresponding inspections must meet the following table: *** see table in Note [1] *** (2) The percentage of castings inspected by	of variation of the material properties that are equivalent to those of wrought alloy products of similar composition. Process monitoring must include testing of coupons cut from the prolongations of each casting (or each set of castings, if produced from a single pour into a single mold in a runner system) and, on a sampling basis, coupons cut from critical areas of production castings. The acceptance criteria for the process monitoring inspections and tests must be established and included in the process specifications to ensure the properties of the production castings are controlled to within levels used in design. (ii) Each casting receives: (A) Inspection of 100 percent of its surface, using visual inspection and liquid penetrant or equivalent inspection methods; and (B) Inspection of structurally significant internal areas and areas where defects are likely to occur, using radiographic or equivalent inspection methods. (iii) One casting undergoes a static test and is shown to	

nonvisual methods may be reduced below that specified in paragraph (d)(1) of this section when an approved quality control procedure is established. (3) For castings procured to a specification that guarantees the mechanical properties of the material in the casting and provides for demonstration of these properties by test of coupons cut from the castings on a sampling basis— (i) A casting factor of 1.0 may be used; and (ii) The castings must be inspected as provided in paragraph (d)(1) of this section for casting factors of "1.25 through 1.50" and tested under paragraph (c)(2) of this section.	meet the strength and deformation requirements of § 25.305(a) and (b). (2) A casting factor of 1.25 or greater may be used, providedthat— (i) Each casting receives: (A) Inspection of 100 percent of its surface, using visual inspection and liquid penetrant or equivalent inspection methods; and (B) Inspection of structurally significant internal areas and areas where defects are likely to occur, using radiographic or equivalent inspection methods. (ii) Three castings undergo static tests and are shown to meet: (A) The strength requirements of § 25.305(b) at an ultimate load corresponding to a casting factor of 1.25; and (B) The deformation requirements of § 25.305(a) at a load of 1.15 times the limit load. (3) A casting factor of 1.50 or greater may be used, provided that— (i) Each casting receives: (A) Inspection of 100 percent of its surface, using visual inspection and liquid penetrant or equivalent inspection methods; and	

	(B) Inspection of structurally significant internal areas and areas where defects are likely to occur, using radiographic or equivalent inspection methods. (ii) One casting undergoes a static test and is shown to meet: (A) The strength requirements of § 25.305(b) at an ultimate load corresponding to a casting factor of 1.50; and (B) The deformation requirements of § 25.305(a) at a load of 1.15 times the limit load. (d) Non-critical castings. For each casting other than critical castings, as specified in paragraph (c) of this section, the following apply: (1) A casting factor of 1.0 or greater may be used, provided that the requirements of (c)(1) of this section are met, or all of the following conditions are met: (i) Castings are manufactured to approved specifications that specify the minimum mechanical properties of the material in the casting and provides for demonstration of these properties by testing of coupons cut from the castings on a sampling basis. (ii) Each casting receives:	

	(A) Inspection of 100 percent of its surface, using visual inspection and liquid penetrant or equivalent inspection methods; and (B) Inspection of structurally significant internal areas and areas where defects are likely to occur, using radiographic or equivalent inspection methods. (iii) Three sample castings undergo static tests and are shown to meet the strength and deformation requirements of § 25.305(a) and (b). (2) A casting factor of 1.25 or greater may be used, provided that each casting receives: (i) Inspection of 100 percent of its surface, using visual inspection and liquid penetrant or equivalent inspection methods; and (ii) Inspection of structurally significant internal areas and areas where defects are likely to occur, using radiographic or equivalent inspection methods. (3) A casting factor of 1.5 or greater may be used, provided that each casting receives inspection of 100 percent of its surface using visual inspection and liquid penetrant or equivalent inspection methods.	

	(4) A casting factor of 2.0 or greater may be used, provided that each casting receives inspection of 100 percent of its surface using visual inspection methods. (5) The number of castings per production batch to be inspected by non-visual methods in accordance with paragraphs (d)(2) and (3) of this section may be reduced when an approved quality control procedure is established.	

[1] table for section (d)(1), amdt 25-138

Casting fator	**Inspection**
2.0 or more	100 percent visual.
Less than 2.0 but more than 1.5	100 percent visual, and magnetic particle or penetrant or equivalent nondestructive inspection methods.
1.25 through 1.50	100 percent visual, magnetic particle or penetrant, and radiographic, or approved equivalent nondestructive inspection methods.

25.683		Justificativa
RBAC 25 Emenda 25-138	**RBAC 25 Emenda 25-139**	
§ 25.683 Operation tests. It must be shown by operation tests that when portions of the control system subject to pilot effort loads are loaded to 80 percent of the limit load specified	**25.683 Operation tests.** (a) It must be shown by operation tests that when portions of the control system subject to pilot effort loads are loaded to 80 percent of the limit load specified for the system and the powered portions of the control system are	O item a) inclui todo o requisito da emenda anterior, apenas com mudança na numeração dos parágrafos. Foram adicionados os itens b) e c) para se considerar a deflexão da estrutura do avião e cargas de vibração. Essa revisão

for the system and the powered portions of the control system are loaded to the maximum load expected in normal operation, the system is free from— (a) Jamming; (b) Excessive friction; and (c) Excessive deflection.	loaded to the maximum load expected in normal operation, the system is free from— (1) Jamming; (2) Excessive friction; and (3) Excessive deflection. (b) It must be shown by analysis and, where necessary, by tests, that in the presence of deflections of the airplane structure due to the separate application of pitch, roll, and yaw limit maneuver loads, the control system, when loaded to obtain these limit loads and operated within its operational range of deflections, can be exercised about all control axes and remain free from— (1) Jamming; (2) Excessive friction; (3) Disconnection; and (4) Any form of permanent damage. (c) It must be shown that under vibration loads in the normal flight and ground operating conditions, no hazard can result from interference or contact with adjacent elements.	não adiciona novos requisitos além do que os fabricantes atendem atualmente para a certificação EASA e não afeta as práticas atuais de projeto da indústria. Esta revisão também visa a harmonizar o texto com a FAA e a EASA.

25.721		Justificativa
RBAC 25 Emenda 25-138	**RBAC 25 Emenda 25-139**	
§25.721 General. (a) The main landing gear system must be designed so that if it fails due to overloads during takeoff and landing (assuming the overloads to act in the upward	**25.721 General.** (a) The landing gear system must be designed so that when it fails due to overloads during takeoff and landing, the failure mode is not likely to cause spillage of enough fuel to constitute a	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.

and aft directions), the failure mode is not likely to cause-- (1) For airplanes that have a passenger seating configuration, excluding pilots seats, of nine seats or less, the spillage of enough fuel from any fuel system in the fuselage to constitute a fire hazard; and (2) For airplanes that have a passenger seating configuration, excluding pilots seats, of 10 seats or more, the spillage of enough fuel from any part of the fuel system to constitute a fire hazard. (b) Each airplane that has a passenger seating configuration excluding pilot seats, of 10 or more must be designed so that with the airplane under control it can be landed on a paved runway with any one or more landing gear legs not extended without sustaining a structural component failure that is likely to cause the spillage of enough fuel to constitute a fire hazard. (c) Compliance with the provisions of this section may be shown by analysis or tests, or both.	fire hazard. The overloads must be assumed to act in the upward and aft directions in combination with side loads acting inboard and outboard. In the absence of a more rational analysis, the side loads must be assumed to be up to 20 percent of the vertical load or 20 percent of the drag load, whichever is greater. (b) The airplane must be designed to avoid any rupture leading to the spillage of enough fuel to constitute a fire hazard as a result of a wheels-up landing on a paved runway, under the following minor crash landing conditions: (1) Impact at 5 feet-per-second vertical velocity, with the airplane under control, at Maximum Design Landing Weight— (i) With the landing gear fully retracted; and (ii) With any one or more landing gear legs not extended. (2) Sliding on the ground, with— (i) The landing gear fully retracted and with up to a 20° yaw angle; and (ii) Any one or more landing gear legs not extended and with 0° yaw angle. (c) For configurations where the engine nacelle is likely to come into contact with the ground, the engine pylon or engine mounting must be designed so that when it fails due to overloads (assuming the overloads to act	Essa proposta não adiciona novos requisitos além do que os fabricantes atendem atualmente para a certificação da EASA e não afetaria as práticas atuais de design da indústria. A Seção 25.721 é revisada para: • Expandir as condições de falha do trem de pouso para incluir cargas laterais, em adição às cargas para cima e para trás, e expandir esse requisito para incluir, além do trem de pouso principal, o trem de pouso de nariz; • Especificar que se assume que as condições de pouso com rodas recolhidas (*wheels-up landing*) ocorrem durante um poucso a uma velocidade de descida de 5 pés por segundo (1,52 metros por segundo); • Adicionar uma condição de deslize no solo; e Requerer que os suportes do motor sejam projetados para que, quando falhar devido à sobrecarga, essa falha não cause derrame de combustível em quantidade que represente perigo de incêndio.

	predominantly in the upward direction and separately, predominantly in the aft direction), the failure mode is not likely to cause the spillage of enough fuel to constitute a fire hazard.	

25.787		Justificativa
RBAC 25 Emenda 25-138	**RBAC 25 Emenda 25-139**	
§ Sec. 25.787 Stowage compartments. (a) Each compartment for the stowage of cargo, baggage, carry-on articles, and equipment (such as life rafts), and any other stowage compartment must be designed for its placarded maximum weight of contents and for the critical load distribution at the appropriate maximum load factors corresponding to the specified flight and ground load conditions, and to the emergency landing conditions of Sec. 25.561(b), except that the forces specified in the emergency landing conditions need not be applied to compartments located below, or forward, of all occupants in the airplane. If the airplane has a passenger seating configuration, excluding pilots seats, of 10 seats or more, each stowage compartment in the passenger cabin, except for underseat and overhead compartments for passenger	**25.787 Stowage compartments.** (a) Each compartment for the stowage of cargo, baggage, carry-on articles, and equipment (such as life rafts), and any other stowage compartment, must be designed for its placarded maximum weight of contents and for the critical load distribution at the appropriate maximum load factors corresponding to the specified flight and ground load conditions, and to those emergency landing conditions of § 25.561(b)(3) for which the breaking loose of the contents of such compartments in the specified direction could— (1) Cause direct injury to occupants; (2) Penetrate fuel tanks or lines or cause fire or explosion hazard by damage to adjacent systems; or (3) Nullify any of the escape facilities provided for use after an emergency landing. If the airplane has a passenger-seating configuration, excluding pilot seats, of 10 seats or more, each stowage compartment in the passenger cabin, except for under seat and overhead compartments for passenger	O item a) foi revisado para expandir o conceito do possível perigo associado à movimentação do conteúdo dos compartimentos, incluindo possíveis danos a linhas e tanques de combustível ou outros perigos. Foi detalhada a menção ao item específico de fatores de carga de emergência. Esta revisão também visa a harmonizar o texto com a FAA e a EASA. Os itens b) e c) não sofreram revisão, foram apenas traduzidos.

convenience, must be completely enclosed. …	convenience, must be completely enclosed. …	

25.963		Justificativa
RBAC 25 Emenda 25-138	**Emenda 25-139**	
§25.963 Fuel tanks: general. … (d) Fuel tanks within the fuselage contour must be able to resist rupture, and to retain fuel, under the inertia forces prescribed for the emergency landing conditions in Sec. 25.561. In addition, these tanks must be in a protected position so that exposure of the tanks to scraping action with the ground is unlikely. …	**25.963 Fuel tanks: general.** … (d) Fuel tanks must, so far as it is practicable, be designed, located, and installed so that no fuel is released in or near the fuselage, or near the engines, in quantities that would constitute a fire hazard in otherwise survivable emergency landing conditions, and— (1) Fuel tanks must be able to resist rupture and retain fuel under ultimate hydrostatic design conditions in which the pressure P within the tank varies in accordance with the formula: $P = K\rho gL$ Where— P = fuel pressure at each point within the tank ρ = typical fuel density g = acceleration due to gravityShow citation box L = a reference distance between the point of pressure and the tank farthest boundary in the direction of loading K = 4.5 for the forward loading condition for those parts of fuel tanks outside the fuselage pressure boundary K = 9 for the forward loading condition for those parts of fuel tanks within the	Esta regra final altera certos regulamentos de aeronavegabilidade para aviões da categoria transporte, com base nas recomendações do Comitê Consultivo para Criação de Regras de Aviação (ARAC) patrocinado pela FAA. Esta alteração elimina as diferenças regulamentares entre os padrões de aeronavegabilidade da FAA, ANAC e EASA. Esta regra final não adiciona novos requisitos além do que os fabricantes atendem atualmente para a certificação destas autoridades e não afeta as práticas atuais de design do setor. Esta revisão expande os requisitos estruturais e do sistema do tanque de combustível em relação a condições de pouso de emergência e condições de falha do trem de pouso; acrescenta a exigência de que a falha nos fixadores do motor devido à sobrecarga não deva causar perigo por derramamento de combustível. Especificamente, o requisito 25.963(d) foi revisado para: 1) Exigir que os tanques de combustível sejam projetados para que nenhum combustível seja derramado dentro ou perto da fuselagem, ou próximo aos motores, em quantidades que constituam um risco de incêndio em condições de pouso de emergência que, de outra forma, poderiam ser sobrevividas, 2) Definir cargas de pressão do tanque de

	fuselage pressure boundary, or that form part of the fuselage pressure boundary K = 1.5 for the aft loading condition K = 3.0 for the inboard and outboard loading conditions for those parts of fuel tankswithin the fuselage pressure boundary, or that form part of the fuselage pressure boundary K = 1.5 for the inboard and outboard loading conditions for those parts of fuel tanks outside the fuselage pressure boundary K = 6 for the downward loading condition K = 3 for the upward loading condition (2) For those parts of wing fuel tanks near the fuselage or near the engines, the greater of the fuel pressures resulting from paragraphs (d)(2)(i) or (d)(2)(ii) of this section must be used: (i) The fuel pressures resulting from paragraph (d)(1) of this section, and (ii) The lesser of the two following conditions: (A) Fuel pressures resulting from the accelerations specified in § 25.561(b)(3) considering the fuel tank full of fuel at maximum fuel density. Fuel pressures based on the 9.0g forward acceleration may be calculated using the fuel static head equal to the streamwise local chord of the tank. For inboard and outboard conditions, an acceleration of 1.5g may be used in lieu of 3.0g as specified in § 25.561(b)(3). (B) Fuel pressures resulting from the accelerations as specified in §	combustível para tanques de combustível localizados dentro e fora do limite de pressão da fuselagem e perto da fuselagem ou perto dos motores, e 3) Especificar as condições de pouso com as rodas e o trem de pouso recolhidos e condições de falha no suporte do motor que devem ser consideradas ao avaliar a integridade estrutural do tanque de combustível.

	25.561(b)(3) considering a fuel volume beyond 85 percent of the maximum permissible volume in each tank using the static head associated with the 85 percent fuel level. A typical density of the appropriate fuel may be used. For inboard and outboard conditions, an acceleration of 1.5g may be used in lieu of 3.0g as specified in § 25.561(b)(3). (3) Fuel tank internal barriers and baffles may be considered as solid boundaries if shown to be effective in limiting fuel flow. (4) For each fuel tank and surrounding airframe structure, the effects of crushing and scraping actions with the ground must not cause the spillage of enough fuel, or generate temperatures that would constitute a fire hazard under the conditions specified in § 25.721(b). (5) Fuel tank installations must be such that the tanks will not rupture as a result of the landing gear or an engine pylon or engine mount tearing away as specified in § 25.721(a) and (c).	

25.994		Justificativa
RBAC 25 Emenda 25-138	**RBAC 25 Emenda 25-139**	
§ 25.994 Fuel system components. Fuel system components in an engine nacelle or in the fuselage must be protected from damage which could result in spillage of enough fuel to constitute a fire	**25.994 Fuel system components.** Fuel system components in an engine nacelle or in the fuselage must be protected from damage that could result in spillage of enough fuel to constitute a fire hazard as a result of a wheels-up landing on a paved runway	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.

hazard as a result of a wheels-up landing on a paved runway.	under each of the conditions prescribed in § 25.721(b).	Esta regra final altera certos regulamentos de aeronavegabilidade para aviões da categoria transporte, com base nas recomendações do Comitê Consultivo para Criação de Regras de Aviação (ARAC), patrocinado pela FAA. Esta alteração elimina as diferenças regulamentares entre os padrões de aeronavegabilidade da FAA e a Agência Europeia para a Segurança da Aviação (EASA). Ele não adiciona novos requisitos além do que os fabricantes atendem atualmente para a certificação EASA e não afeta as práticas atuais de projeto do setor. Este §25.994 na regra final foi revisado para especificar as condições de pouso com trem de pouso recolhido a serem consideradas na avaliação dos componentes do sistema de combustível.