Tabela de diferenças entre emendas e justificativas Emenda 140 para 141

25.331		Justificativa
RBAC Emenda 25-140	**RBAC 25 Emenda 25-141**	Baseado no ARAC (Comitê Consultivo de Regras da Aviação) promovido pela FAA, o RBAC 25.331 está sendo revisado para eliminar as diferenças regulatórias entre as autoridades – ANAC, FAA e EASA, por meio da harmonização do requisito. As alterações realizadas não adicionam novos requisitos além daqueles que os requerentes estão habituados a cumprir para a certificação da ANAC, FAA e EASA, e também não afeta as práticas atuais de projeto da indústria. O RBAC 25.331 "Condições de manobras simétricas" está sendo revisado para prescrever cargas de manobras corrigidas de arfagem, positivas e negativas, que levam em consideração o tamanho do avião e qualquer efeito do sistema de comando de voo. O critério de cálculo de carga, agora incorporado ao 25.331(c)(2), já vinha sendo requerido aos fabricantes por meio de FCAR ELOS. A modificação no requisito promove a inclusão das curvas de deslocamento do comando de arfagem na cabine do piloto, bem como os respectivos fatores de cargas longitudinais a serem alcançados durante a manobra.
25.331 Symmetric maneuvering conditions. … (c) Maneuvering pitching conditions. The following conditions involving pitching acceleration must be investigated: ... (2) Specified control displacement. A checked maneuver, based on a rational pitching control motion vs. time profile, must be established in which the design limit load factor specified in Sec. 25.337 will not be exceeded. Unless lesser values cannot be exceeded, the airplane response must result in pitching accelerations not less than the following: (i) A positive pitching acceleration (nose up) is assumed to be reached concurrently with the airplane load factor of 1.0 (points A1 to D1, Sec. 25.333(b)). The positive acceleration must be equal to at least 39n/V (n-1.5), Radians/sec^2 where- n is the positive load factor at the speed under consideration; and V is the airplane equivalent speed in knots. (ii) A negative pitching acceleration (nose down) is assumed to be reached concurrently with the	**25.331 Symmetric maneuvering conditions.** … (c) Maneuvering pitching conditions. The following conditions must be investigated: ... (2) Checked maneuver between V A and V D. Nose-up checked pitching maneuvers must be analyzed in which the positive limit load factor prescribed in § 25.337 is achieved. As a separate condition, nose-down checked pitching maneuvers must be analyzed in which a limit load factor of 0g is achieved. In defining the airplane loads, the flight deck pitch control motions described in paragraphs (c)(2)(i) through (iv) of this section must be used: (i) The airplane is assumed to be flying in steady level flight at any speed between V Aand V D and the flight deck pitch control is moved in accordance with the following formula: δ(t) = δ1 sin(ωt) for 0 ≤ t ≤t max Where— δ1= the maximum available displacement of the flight deck pitch control in the initial direction, as limited by the control system stops, control	

positive maneuvering load factor (points A2 to D2, Sec. 25.333(b)). This negative pitching acceleration must be equal to at least -26n/V (n-1.5), Radians/sec^2 where- n is the positive load factor at the speed under consideration; and V is the airplane equivalent speed in knots. (d) [Removed.]	surface stops, or by pilot effort in accordance with § 25.397(b); δ(t) = the displacement of the flight deck pitch control as a function of time. In the initial direction, δ(t) is limited to δ1. In the reverse direction, δ(t) may be truncated at the maximum available displacement of the flight deck pitch control as limited by the control system stops, control surface stops, or by pilot effort in accordance with 25.397(b); t max= 3π/2ω; ω = the circular frequency (radians/second) of the control deflection taken equal to the undamped natural frequency of the short period rigid mode of the airplane, with active control system effects included where appropriate; but not less than: Where $\omega = \frac{\pi V}{2V_A}$ radianos/segundo V = the speed of the airplane at entry to the maneuver. V A= the design maneuvering speed prescribed in § 25.335(c). (ii) For nose-up pitching maneuvers, the complete flight deck pitch control displacement history may be scaled down in amplitude to the extent necessary to ensure that the positive limit load factor prescribed in § 25.337 is not exceeded. For nose-down	

pitching maneuvers, the complete flight deck control displacement history may be scaled down in amplitude to the extent necessary to ensure that the normal acceleration at the center of gravity does not go below 0g.

(iii) In addition, for cases where the airplane response to the specified flight deck pitch control motion does not achieve the prescribed limit load factors, then the following flight deck pitch control motion must be used:

$\delta(t) = \delta_1 \sin(\omega t)$ for $0 \leq t \leq t_1$

$\delta(t) = \delta_1$ for $t_1 \leq t \leq t_2$

$\delta(t) = \delta_1 \sin(\omega[t + t_1 - t_2])$ for $t_2 \leq t \leq t_{max}$

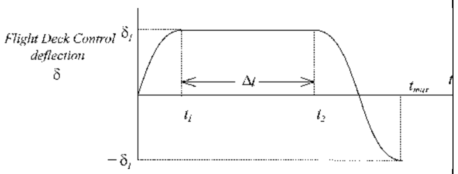
Where—

$t_1 = \pi/2\omega$

$t_2 = t_1 + \Delta t$

$t_{max} = t_2 + \pi/\omega$;

Δt = the minimum period of time necessary to allow the prescribed limit load factor to be achieved in the initial direction, but it need not exceed five seconds (see figure below).



(iv) In cases where the flight deck pitch control motion may be affected by inputs from systems (for example, by a stick pusher

	that can operate at high load factor as well as at 1g), then the effects of those systems shall be taken into account. (v) Airplane loads that occur beyond the following times need not be considered: (A) For the nose-up pitching maneuver, the time at which the normal acceleration at the center of gravity goes below 0g; (B) For the nose-down pitching maneuver, the time at which the normal acceleration at the center of gravity goes above the positive limit load factor prescribed in § 25.337; (C) t max.	

25.341		**Justificativa**
RBAC Emenda 25-140	**RBAC 25 Emenda 25-141**	
25.341 Gust [and turbulence] loads. [(a) Discrete Gust Design Criteria. The airplane is assumed to be subjected to symmetrical vertical and lateral gusts in level flight. Limit gust loads must be determined in accordance with the following provisions: ... (5) The following reference gust velocities apply: (i) At the airplane design speed VC: Positive and negative gusts with reference gust velocities of 56.0 feet/sec EAS must be considered at	**25.341 Gust and turbulence loads.** (a) Discrete Gust Design Criteria. The airplane is assumed to be subjected to symmetrical vertical and lateral gusts in level flight. Limit gust loads must be determined in accordance with the provisions: ... (5) The following reference gust velocities apply: (i) At airplane speeds between VB and VC: Positive and negative gusts with reference gust velocities of 56.0 ft/sec EAS must be considered at sea level. The reference gust velocity may be reduced linearly from 56.0	Baseado no ARAC (Comitê Consultivo de Regras da Aviação) promovido pela FAA, o RBAC 25.341 está sendo revisado para eliminar as diferenças regulatórias entre as autoridades – ANAC, FAA e EASA, por meio da harmonização do requisito. As alterações realizadas não adicionam novos requisitos além daqueles que os requerentes estão habituados a cumprir para a certificação da EASA, e também não afeta as práticas atuais de projeto da indústria. Esta revisão do RBAC 25.341 englobou:

sea level. The reference gust velocity may be reduced linearly from 56.0 ft/sec EAS at sea level to 44.0 ft/sec EAS at 15000 feet. The reference gust velocity may be further reduced linearly from 44.0 ft/sec EAS at 15000 feet to 26.0 ft/sec ES at 50000 feet. (ii) At the airplane design speed VD: The reference gust velocity must be 0.5 times the value obtained under Sec. 25.341 (a)(5)(i). (6) The flight profile alleviation factor, Fg, must be increased linearly from the sea level value to a value of 1.0 at the maximum operating altitude defined in Sec. 25.1527. At sea level, the flight profile alleviation factor is determined by the following equation: … Zmo = Maximum operating altitude defined in Sec. 25.1527. ... (b) Continuous Gust Design Criteria. The dynamic response of the airplane to vertical and lateral continuous turbulence must be taken into account. The continuous gust design criteria of appendix G of this part must be used to establish the dynamic response unless more rational criteria are shown.]	ft/sec EAS at sea level to 44.0 ft/sec EAS at 15,000 feet. The reference gust velocity may be further reduced linearly from 44.0 ft/sec EAS at 15,000 feet to 20.86 ft/sec EAS at 60,000 feet. (ii) At the airplane design speed VD: The reference gust velocity must be 0.5 times the value obtained under §25.341(a)(5)(i). (6) The flight profile alleviation factor, Fg, must be increased linearly from the sea level value to a value of 1.0 at the maximum operating altitude defined in §25.1527. At sea level, the flight profile alleviation factor is determined by the following equation: … Zmo = Maximum operating altitude defined in §25.1527 (feet). ... (b) Continuous turbulence design criteria. The dynamic response of the airplane to vertical and lateral continuous turbulence must be taken into account. The dynamic analysis must take into account unsteady aerodynamic characteristics and all significant structural degrees of freedom including rigid body motions. The limit loads must be determined for all critical altitudes, weights, and weight distributions as specified in §25.321(b), and all critical speeds within the ranges indicated in §25.341(b)(3).	– Com relação ao critério de projeto de turbulência continua, foi removido o método opcional de análise de missão que era especificado no Apêndice G, em favor do método de análise de envelope de projeto. – O critério de intensidade de turbulência do RBAC 25.341(b) foi atualizado para considerar o resultado das medições feitas em operação das intensidades das rajadas. – Atualizou-se o RBAC 25.341(a) para requerer avaliação das condições de rajada discreta em velocidades do avião desde a velocidade de projeto para a rajada de intensidade máxima, VB, até a velocidade de projeto de cruzeiro, VC, (anteriormente era requerido apenas análise na VC) e especificou-se velocidades de rajada de referência até 60.000 pés, ao invés de 50.000 pés anteriormente especificado. – Adicionou-se um novo parágrafo 25.341(c) que especifica um novo critério de rajada discreta em cada ângulo normal a trajetória de voo (por 360 graus), e um critério de rajada discreta multi-eixo para os aviões equipados com motores montados nas asas.

	(1) Except as provided in paragraphs (b)(4) and (5) of this section, the following equation must be used: $PL = PL-1g \pm U\sigma\bar{A}$ Where— PL = limit load; $PL-1g$ = steady 1g load for the condition; $\bar{A}$ = ratio of root-mean-square incremental load for the condition to root-mean-square turbulence velocity; and $U\sigma$ = limit turbulence intensity in true airspeed, specified in paragraph (b)(3) of this section. (2) Values of $\bar{A}$ must be determined according to the following formula: $$\bar{A} = \sqrt{\int_0^\infty \lvert H(\Omega)\rvert^2 \Phi(\Omega) d\Omega}$$ Where— $H(\Omega)$ = the frequency response function, determined by dynamic analysis, that relates the loads in the aircraft structure to the atmospheric turbulence; and $\Phi(\Omega)$ = normalized power spectral density of atmospheric turbulence given by— $$\Phi(\Omega) = \frac{\pi}{L}\frac{1+\frac{8}{3}(1.339\Omega L)^2}{[1+(1.339\Omega L)^2]^{11/6}}$$ Where—	

	Ω = reduced frequency, radians per foot; and L = scale of turbulence = 2,500 ft. (3) The limit turbulence intensities, Uσ, in feet per second true airspeed required for compliance with this paragraph are— (i) At airplane speeds between VB and VC: Uσ = Uσref.Fg Where— Uσref is the reference turbulence intensity that varies linearly with altitude from 90 fps (TAS) at sea level to 79 fps (TAS) at 24,000 feet and is then constant at 79 fps (TAS) up to the altitude of 60,000 feet. Fg is the flight profile alleviation factor defined in paragraph (a)(6) of this section; (ii) At speed VD: Uσ is equal to 1⁄2 the values obtained under paragraph (b)(3)(i) of this section. (iii) At speeds between VC and VD: Uσ is equal to a value obtained by linear interpolation. (iv) At all speeds, both positive and negative incremental loads due to continuous turbulence must be considered. (4) When an automatic system affecting the dynamic response of the airplane is included in the analysis, the effects of system non-linearities on loads at the limit load level must be taken into account in a realistic or conservative manner.	

	(5) If necessary for the assessment of loads on airplanes with significant non-linearities, it must be assumed that the turbulence field has a root-mean-square velocity equal to 40 percent of the Uσ values specified in paragraph (b)(3) of this section. The value of limit load is that load with the same probability of exceedance in the turbulence field as AUσ of the same load quantity in a linear approximated model. (c) Supplementary gust conditions for wing-mounted engines. For airplanes equipped with wing-mounted engines, the engine mounts, pylons, and wing supporting structure must be designed for the maximum response at the nacelle center of gravity derived from the following dynamic gust conditions applied to the airplane: (1) A discrete gust determined in accordance with §25.341(a) at each angle normal to the flight path, and separately, (2) A pair of discrete gusts, one vertical and one lateral. The length of each of these gusts must be independently tuned to the maximum response in accordance with §25.341(a). The penetration of the airplane in the combined gust field and the phasing of the vertical and lateral component gusts must be established to develop the maximum response to the gust pair. In the	

	absence of a more rational analysis, the following formula must be used for each of the maximum engine loads in all six degrees of freedom: $$P_L = P_{L-1g} \pm 0.85\sqrt{L_V^2 + L_L^2}$$ Where— PL = limit load; PL-1g = steady 1g load for the condition; LV = peak incremental response load due to a vertical gust according to §25.341(a); and LL = peak incremental response load due to a lateral gust according to §25.341(a).	

25.343		Justificativa
RBAC 25 Emenda 25-140	**RBAC 25 Emenda 25-141**	
25.343 Design fuel and oil loads. .. (b) … (1) … **[** (ii) The gust conditions of Sec. 25.341(a) but assuming 85% of the design velocities prescribed in Sec. 25.341(a)(4).**]** …	**25.343 Design fuel and oil loads.** ... (b) … (1) … … (ii) The gust and turbulence conditions of §25.341(a) and (b), but assuming 85% of the gust velocities prescribed in §25.341(a)(4) and 85% of the turbulence intensities prescribed in §25.341(b)(3). …	Esta emenda 25-141 elimina diferenças regulatórias entre os padrões de aeronavegabilidade da FAA e da EASA e toma crédito de medidas de rajadas atualizadas tomadas em serviço para a condição de turbulência continua. A emenda adicionou ao critério de cargas de rajadas discretas o critério de cargas de turbulência continua na avaliação de cargas de projeto para combustível e óleo. Incluiu as rajadas derivadas para a turbulência continua com medidas atualizadas em serviço. Incluiu considerações de rajadas discretas entre a VB até a VC que anteriormente era somente na VC e passou a tomar o valor das intensidades de rajada com altitude considerando agora até um

		limite máximo de altitude de 60000ft ao invés de 50000ft considerado anteriormente.

25.345		**Justificativa**
RBAC 25 Emenda 25-140	**RBAC 25 Emenda 25-141**	
25.345 High lift devices. ... (c) .. (2) The discrete vertical gust criteria in Sec. 25.341(a). ...	**25.345 High lift devices**. ... (c) … (2) The vertical gust and turbulence conditions prescribed in § 25.341(a) and (b). ...	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. O item (c)(2) foi revisado, incluindo nele o requisito de também avaliar os critérios de carga de turbulência contínua do § 25.341(b). Os demais itens não sofreram revisão, foram apenas traduzidos.

25.361		Justificativa
RBAC Emenda 25-140	**RBAC 25 Emenda 25-141**	Esta emenda 141 ao requisito 25.361, para aeronaves da categoria transporte está baseada nas recomendações do Comitê Consultivo de Regulamentação da Aviação (ARAC), proposto pelo FAA. Esta emenda elimina as diferenças entre os mesmos regulamentos da ANAC, FAA e EASA. Ela não adiciona novos requisitos, além daqueles que os fabricantes já cumprem para a certificação da EASA, e não afeta as práticas atuais de projeto da indústria. Esta emenda revisa a aplicação de cargas de rajada nos pontos de
25.361 Engine torque. [(a) Each engine mount and its supporting structure must be designed for the effects of--] (1) A limit engine torque corresponding to takeoff power and propeller speed acting simultaneously with 75 percent of the limit loads from flight condition A of Sec. 25.333(b);	**25.361 Engine and Auxiliary Power Unit Torque** (a) For engine installations— (1) Each engine mount, pylon, and adjacent supporting airframe structures must be designed for the effects of— (i) A limit engine torque corresponding to takeoff power/thrust and, if applicable,	

[(2) A limit torque corresponding to the maximum continuous power and propeller speed, acting simultaneously with the limit loads from flight condition A of Sec. 25.333(b); and] (3) For turbopropeller installations, in addition to the conditions specified in paragraphs (a)(1) and (2) of this section, a limit engine torque corresponding to takeoff power and propeller speed, multiplied by a factor accounting for propeller control system malfunction, including quick feathering, acting simultaneously with lg level flight loads. In the absence of a rational analysis, a factor of 1.6 must be used. (b) For turbine engine installations, the engine mounts and supporting structure must be designed to withstand each of the following: (1) A limit engine torque load imposed by sudden engine stoppage due to malfunction or structural failure (such as compressor jamming). (2) A limit engine torque load imposed by the maximum acceleration of the engine. [(c) The limit engine torque to be considered under paragraph (a) of this section must be obtained by multiplying mean torque for the specified power and speed by a factor of--]	corresponding propeller speed, acting simultaneously with 75% of the limit loads from flight condition A of §25.333(b); (ii) A limit engine torque corresponding to the maximum continuous power/thrust and, if applicable, corresponding propeller speed, acting simultaneously with the limit loads from flight condition A of §25.333(b); and (iii) For turbopropeller installations only, in addition to the conditions specified in paragraphs (a)(1)(i) and (ii) of this section, a limit engine torque corresponding to takeoff power and propeller speed, multiplied by a factor accounting for propeller control system malfunction, including quick feathering, acting simultaneously with 1g level flight loads. In the absence of a rational analysis, a factor of 1.6 must be used. (2) The limit engine torque to be considered under paragraph (a)(1) of this section must be obtained by— (i) For turbopropeller installations, multiplying mean engine torque for the specified power/thrust and speed by a factor of 1.25; (ii) For other turbine engines, the limit engine torque must be equal	montagem do berço do motor, adiciona um critério de rajada discreta 360 graus e um critério de rajada discreta multi-axial para aeronaves equipadas com motores montados nas asas. A emenda revisa o critério de cargas de torque no motor e adiciona uma condição de falha de carga dinâmica no motor.

(1) 1.25 for turbopropeller installations; (2) 1.33 for reciprocating engines with five or more cylinders; or (3) Two, three, or four, for engines with four, three, or two cylinders, respectively.	to the maximum accelerating torque for the case considered. (3) The engine mounts, pylons, and adjacent supporting airframe structure must be designed to withstand 1g level flight loads acting simultaneously with the limit engine torque loads imposed by each of the following conditions to be considered separately: (i) Sudden maximum engine deceleration due to malfunction or abnormal condition; and (ii) The maximum acceleration of engine. (b) For auxiliary power unit installations, the power unit mounts and adjacent supporting airframe structure must be designed to withstand 1g level flight loads acting simultaneously with the limit torque loads imposed by each of the following conditions to be considered separately: (1) Sudden maximum auxiliary power unit deceleration due to malfunction, abnormal condition, or structural failure; and (2) The maximum acceleration of the auxiliary power unit.	

25.362		**Justificativa**
RBAC Emenda 25-140	**RBAC 25 Emenda 25-141**	
[Não existente]	**25.362 Engine failure loads.** (a) For engine mounts, pylons, and adjacent supporting airframe	Baseado no ARAC (Comitê Consultivo de Regras da Aviação) promovido pela FAA, o RBAC 25.362 está sendo revisado para

	structure, an ultimate loading condition must be considered that combines 1g flight loads with the most critical transient dynamic loads and vibrations, as determined by dynamic analysis, resulting from failure of a blade, shaft, bearing or bearing support, or bird strike event. Any permanent deformation from these ultimate load conditions must not prevent continued safe flight and landing. (b) The ultimate loads developed from the conditions specified in paragraph (a) of this section are to be— (1) Multiplied by a factor of 1.0 when applied to engine mounts and pylons; and (2) Multiplied by a factor of 1.25 when applied to adjacent supporting airframe structure.	eliminar as diferenças regulatórias entre as autoridades – ANAC, FAA e EASA, por meio da harmonização do requisito. As alterações realizadas não adicionam novos requisitos além daqueles que os requerentes estão habituados a cumprir para a certificação da ANAC, FAA e EASA, e também não afeta as práticas atuais de projeto da indústria. O RBAC 25.362 é um novo requisito, adicionado para requerer que os montantes do motor e as estruturas de suporte do motor sejam projetados para suportar as cargas do voo a 1g combinadas com as cargas dinâmicas transientes e vibrações críticas que resultem da falha de uma pá, eixo, mancal ou suporte de mancal, ou de um evento de impacto de pássaro.

25.371		Justificativa
RBAC Emenda 25-140	**RBAC 25 Emenda 25-141**	
25.371 Gyroscopic loads. The structure supporting any engine or auxiliary power unit must be designed for the loads including the gyroscopic loads arising from the conditions specified in Secs. 25.331, 25.341(a), 25.349, 25.351, 25.473, 25.479, and 25.481, with the engine or auxiliary power unit at the maximum rpm appropriate to the condition. For the purposes of	**25.371 Gyroscopic loads.** The structure supporting any engine or auxiliary power unit must be designed for the loads, including gyroscopic loads, arising from the conditions specified in §§ 25.331, 25.341, 25.349, 25.351, 25.473, 25.479, and 25.481, with the engine or auxiliary power unit at the maximum rotating speed	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. O requisito foi revisado, passando a citar o requisito 25.341 inteiro, quando antes constava apenas o 25.341(a). Com esta expansão, inclui-se a

compliance with this section, the pitch maneuver in Sec. 25.331(c)(1) must be carried out until the positive limit maneuvering load factor (point A2 in Sec. 25.333(b)) is reached.	appropriate to the condition. For the purposes of compliance with this paragraph, the pitch maneuver in § 25.331(c)(1) must be carried out until the positive limit maneuvering load factor (point A_2 in § 25.333(b)) is reached.	necessidade de avaliar também os critérios de carga de turbulência contínua do § 25.341(b). Houve também pequenas melhorias no palavreado e pontuação.

25.373		Justificativa
RBAC Emenda 25-140	**RBAC 25 Emenda 25-141**	
25.373 Speed control devices. … **[** (a) The airplane must be designed for the symmetrical maneuvers prescribed in Sec. 25.333 and Sec. 25.337, the yawing maneuvers prescribed in Sec. 25.351, and the vertical and lateral gust conditions prescribed in Sec. 25.341(a), at each setting and the maximum speed associated with that setting; and**]** ...	**25.373 Speed control devices.** … (a) The airplane must be designed for the symmetrical maneuvers prescribed in §§25.333 and 25.337, the yawing maneuvers in §25.351, and the vertical and lateral gust and turbulence conditions prescribed in §25.341(a) and (b) at each setting and the maximum speed associated with that setting; and ...	Foi adicionada a condição de turbulência continua sobre o requisito de dispositivos de controle de velocidade. Além disso, foi proposto revisar também nas emendas 25-86 e 25-141 os requisitos de cargas de projeto de rajada para aeronaves categoria transporte. As mudanças propostas deveriam: (1) repor o requisito corrente de rajada discreta com um novo requisito para a rajada discreta tunada; (2) modificar o metodo de estabelecer a velocidade de projeto para a máxima intensidade de rajada; e (3) fornecer uma velocidade operacional de ar turbulento. Essas mudanças são propostas na ordem de fornecer uma base mais racional para somar nas características dinâmicas estruturais e aerodinâmicas da aeronave. Essas mudanças propostas também forneceriam para uma harmonização dos requisitos de rajada discreta com a Joint Aviation Requirements (JAR) da Europa como recentemente emendado.

25.391		Justificativa
RBAC 25 Emenda 25-140	**RBAC 25 Emenda 25-141**	
Sec. 25.391 Control surface loads: general. **[**The control surfaces must be designed for the limit loads resulting from the flight conditions in Secs. 25.331, 25.341(a), 25.349 and 25.351 and the ground gust conditions in Sec. 25.415, considering the requirements for**--]** …	**25.391 Control surface loads: General.** The control surfaces must be designed for the limit loads resulting from the flight conditions in §§25.331, 25.341(a) and (b), 25.349, and 25.351, considering the requirements for— ...	Foi adicionada a condição de turbulência continua sobre o requisito de dispositivos de controle de velocidade. Além disso, foi proposto revisar também nas emendas 25-86 e 25-141 os requisitos de cargas de projeto de rajada para aeronaves categoria transporte. As mudanças propostas deveriam: (1) repor o requisito corrente de rajada discreta com um novo requisito para a rajada discreta tunada; (2) modificar o método de estabelecer a velocidade de projeto para a máxima intensidade de rajada; e (3) fornecer uma velocidade operacional de ar turbulento. Essas mudanças são propostas na ordem de fornecer uma base mais racional para somar nas características dinâmicas estruturais e aerodinâmicas da aeronave. Essas mudanças propostas também forneceriam para uma harmonização dos requisitos de rajada discreta com a Joint Aviation Requirements (JAR) da Europa como recentemente emendado.

25.395		Justificativa
RBAC 25 Emenda 25-140	**RBAC 25 Emenda 25-141**	
25.395 Control system. ... **[**(b) The system limit loads, except the loads resulting from ground gusts, need not exceed the loads that can be	**25.395 Control system.** ... (b) The system limit loads of paragraph (a) of this section need not	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

produced by the pilot (or pilots) and by automatic or power devices operating the controls. …	exceed the loads that can be produced by the pilot (or pilots) and by automatic or power devices operating the controls. ...	(*Federal Aviation Administration*). Esta alteração elimina as diferenças regulamentares entre os padrões de aeronavegabilidade do Brasil (ANAC), 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. Esta regra final revisa os critérios de carga do projeto da manobra de arfagem; revisa os critérios de carga de projeto de rajada e turbulência; revisa a aplicação de cargas de rajada em montagens de motor, dispositivos hiper-sustentadores e outras superfícies de controle; adiciona um critério de rajada discreta `` atuando 360 graus " e um critério de rajada discreta de vários eixos para aviões equipados com motores montados nas asas; revisa os critérios de carga de torque do motor; adiciona uma condição de carga dinâmica de falha do motor; revisa os critérios de carga do projeto de rajada em solo; revisa os critérios usados para estabelecer a velocidade de projeto em ar turbulento; e requer o estabelecimento de um número Mach em ar turbulento.

25.415		Justificativa
RBAC Emenda 25-140	**RBAC 25 Emenda 25-141**	Baseado no ARAC (Comitê Consultivo de Regras da Aviação) promovido pela FAA, o RBAC 25.415 está sendo revisado para eliminar as diferenças regulatórias entre as
25.415 Ground gust conditions. (a) The control system must be designed as follows for control surface loads due to ground gusts and taxiing downwind: (1) The control system between the stops nearest the surfaces and the cockpit controls must be designed for loads corresponding to the limit hinge moments H of paragraph (a)(2) of this section. These loads need	**25.415 Ground gust conditions.** (a) The flight control systems and surfaces must be designed for the limit loads generated when the airplane is subjected to a horizontal 65-knot ground gust from any direction while taxiing and while parked. For airplanes equipped with	

not exceed--
(i) The loads corresponding to the maximum pilot loads in Sec. 25.397(c) for each pilot alone; or
(ii) 0.75 times these maximum loads for each pilot when the pilot forces are applied in the same direction.
[(2) The control system stops nearest the surfaces, the control system locks, and the parts of the systems (if any) between these stops and locks and the control surface horns, must be designed for limit hinge moments, H, in foot pounds, obtained from the formula, $H = .0034KV^2cS$, where--
V = 65 (wind speed in knots)
K = limit hinge moment factor for ground gusts derived in paragraph (b) of this section.
c = mean chord of the control surface aft of the hinge line (ft);
S = area of the control surface aft of the hinge line (sq ft);**]**
(b) The limit hinge moment factor K for ground gusts must be derived as follows:

Surface		*K*	Position of controls	
	(a) Aileron ------------------------	0.75	Control column locked or lashed in mid-position.	
	(b) Aileron ------------------------- (c) Elevator-------------------	*±0.50 *±0.75	Ailerons at full throw. (c) Elevator full down. (d) Elevator	

control system gust locks, the taxiing condition must be evaluated with the controls locked and unlocked, and the parked condition must be evaluated with the controls locked.
(b) The control system and surface loads due to ground gust may be assumed to be static loads, and the hinge moments H must be computed from the formula:
$H = K (1/2) \rho_o V^2 c S$
Where—
K = hinge moment factor for ground gusts derived in paragraph (c) of this section;
ρ_o= density of air at sea level;
V = 65 knots relative to the aircraft;
S = area of the control surface aft of the hinge line;
c = mean aerodynamic chord of the control surface aft of the hinge line.
(c) The hinge moment factor K for ground gusts must be taken from the following table:

Surface	**K**	**Position of controls**
(1) Aileron	0.75	Control column locked or lashed in mid-position.
(2) Aileron	* ±0.50	Ailerons at full throw.
(3) Elevator	* ±0.75	Elevator full down.

autoridades – ANAC, FAA e EASA, por meio da harmonização do requisito. As alterações realizadas não adicionam novos requisitos além daqueles que os requerentes estão habituados a cumprir para a certificação da ANAC, FAA e EASA, e também não afeta as práticas atuais de projeto da indústria.
O RBAC 25.415 está sendo revisado para:
- Reorganizar e esclarecer que para aeronaves equipadas com travas de superfícies de comando, as cargas de rajada no solo na condição de taxi devem ser avaliadas com as travas ativadas e desativadas, enquanto a condição estacionada deve ser avaliada apenas com a trava ativada.
- Identificar as partes e componentes do sistema de comando para as quais cada uma

	(d) Elevator-------------------- (e) Rudder------------------------- (f) Rudder--------------------------	*± 0.75 0.75 0.75	full up. (e) Rudder in neutral. (f) Rudder at full throw.	

* A positive value of *K* indicates a moment tending to depress the surface, while a negative value of *K* indicates a moment tending to raise the surface.

(4) Elevator	* ±0.75	Elevator full up.
(5) Rudder	0.75	Rudder in neutral.
(6) Rudder	0.75	Rudder at full throw.
** A positive value of K indicates a moment tending to depress the surface, while a negative value of K indicates a moment tending to raise the surface.*		

(d) The computed hinge moment of paragraph (b) of this section must be used to determine the limit loads due to ground gust conditions for the control surface. A 1.25 factor on the computed hinge moments must be

das condições prescritas se aplicam.
- Deixar separados e independentes os fatores de multiplicação necessários e fornecer um fator de multiplicação adicional para levar em conta os efeitos da amplificação dinâmica.

	used in calculating limit control system loads. (e) Where control system flexibility is such that the rate of load application in the ground gust conditions might produce transient stresses appreciably higher than those corresponding to static loads, in the absence of a rational analysis substantiating a different dynamic factor, an additional factor of 1.6 must be applied to the control system loads of paragraph (d) of this section to obtain limit loads. If a rational analysis is used, the additional factor must not be less than 1.2. (f) For the condition of the control locks engaged, the control surfaces, the control system locks, and the parts of any control systems between the surfaces and the locks must be designed to the resultant limit loads. Where control locks are not provided, then the control surfaces, the control system stops nearest the surfaces, and the parts of any control systems between the surfaces and the stops must be designed to the resultant limit loads. If the control system design is such as to allow any part of the control system to impact with the stops due to flexibility, then the resultant impact loads must be taken into account in deriving the limit loads due to ground gust. (g) For the condition of taxiing with the control locks disengaged, or	

	where control locks are not provided, the following apply: (1) The control surfaces, the control system stops nearest the surfaces, and the parts of any control systems between the surfaces and the stops must be designed to the resultant limit loads. (2) The parts of the control systems between the stops nearest the surfaces and the flight deck controls must be designed to the resultant limit loads, except that the parts of the control system where loads are eventually reacted by the pilot need not exceed: (i) The loads corresponding to the maximum pilot loads in § 25.397(c) for each pilot alone; or (ii) 0.75 times these maximum loads for each pilot when the pilot forces are applied in the same direction.	

25.1517		Justificativa
RBAC Emenda 25-140	**RBAC 25 Emenda 25-141**	
25.1517 [Rough air speed, V_{RA}.] **[**A rough air speed, V_{RA}, for use as the recommended turbulence penetration airspeed in Sec. 25.1585(a)(8), must be established, which— (1) Is not greater than the design airspeed for maximum gust intensity, selected for V_B; and (2) Is not less then the minimum value of V_B specified in Sec. 25.335(d); and	**25.1517 Rough air speed, VRA.** (a) A rough air speed, $V_{RA,}$ for use as the recommended turbulence penetration airspeed, and a rough air Mach number, M_{RA}, for use as the recommended turbulence penetration Mach number, must be established. V_{RA}/M_{RA} must be sufficiently less than V_{MO}/M_{MO} to ensure that likely speed variation during	Este regulamento final emenda certos requisitos de aeronavegabilidade para aeronaves categoria transporte, baseados sobre recomendações da FAA – patrocinado pela Aviation Rulemaking Advisory Committee (ARAC). Esta emenda elimina diferenças regulatórias entre padrões de aeronavegabilidade da FAA e European Aviation Safety Agency (EASA). Ele não adiciona novos requisitos além do que fabricantes correntemente encontram para a certificação da EASA e não afetam correntes práticas de projeto industriais.

(3) Is sufficiently less than V_{MO} to ensure that likely speed variation during rough air encounters will not cause the overspeed warning to operate too frequently. In the absence of a rational investigation substantiating the use of other values, V_{RA} must be less than V_{MO}--35 knots (TAS).**]**	rough air encounters will not cause the overspeed warning to operate too frequently. (b) At altitudes where V_{MO} is not limited by Mach number, in the absence of a rational investigation substantiating the use of other values, V_{RA} must be less than V_{MO}—35 KTAS. (c) At altitudes where V_{MO} is limited by Mach number, M_{RA} may be chosen to provide an optimum margin between low and high speed buffet boundaries.	Esta regra final revisa o §25.1517 para remover a referência a VB na definição da velocidade em ar turbulento e requerer que um número de Mach em ar turbulento, MRA, seja estabelecido adicionalmente à velocidade de projeto em ar turbulento. Esta revisão também remove a referência ao §25.1585 "Procedimentos operacionais", porque ela não é mais aplicável, uma vez que o §25.1585 foi alterado.

Apêndice G ao RBAC 25		**Justificativa**
RBAC Emenda 25-140	**RBAC 25 Emenda 25-141**	
G25.1 Appendix G--Continuous Gust Design Criteria The continuous gust design criteria in this appendix must be used in establishing the dynamic response of the airplane to vertical and lateral continuous turbulences unless a more rational criteria is used. The following gust load requirements apply to mission analysis and design envelope analysis: (a) The limit gust loads utilizing the continuous turbulence concept must be determined in accordance with the provisions of either paragraph (b) or paragraphs (c) and (d) of this appendix. (b) Design envelope analysis. The limit loads must be determined in accordance with the following:	Appendix G--Reserved	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. O Apêndice G "Critérios de projeto de rajada contínua" do RBAC 25 foi removido, mantendo-se como "reservado". Os critérios, antes contidos no Apêndice G estão agora estabelecidos no parágrafo 25.341 na Emenda 141.

(1) All critical altitudes, weights, and weight distributions, as specified in Sec. 25.321(b), and all critical speeds within the ranges indicated in paragraph (b)(3) of this appendix must be considered. (2) Values of (ratio of root-mean-square incremental load root-mean-square gust velocity) must be determined by dynamic analysis. The power spectral density of the atmospheric turbulence must be as given by the equation-- $\phi(\Omega) = \sigma^2 L / \pi \; \frac{1+\frac{8}{3}(1.339 L\Omega)^2}{\left[1+(1.339 L\Omega)^2\right]^{\frac{11}{6}}}$ where: = power-spectral density (ft./sec.)2/ rad./ft. = root-mean-square gust velocity, ft./sec. = reduced frequency, radians per foot. L = 2,500 ft. (3) The limit loads must be obtained by multiplying the values determined by the dynamic analysis by the following values of the gust velocity : (i) At speed fps true gust velocity in the interval 0 to 30,000 ft. altitude and is linearly decreased to 30 fps true gust velocity at 80,000 ft. altitude. Where the Administrator finds that a design is comparable to a similar design with extensive satisfactory service experience, it		

will be acceptable to select less than 85 fps, but not less than 75 fps, with linear decrease from that value at 20,000 feet to 30 fps at 80,000 feet. The following factors will be taken into account when assessing comparability to a similar design: (1) The transfer function of the new design should exhibit no unusual characteristics as compared to the similar design which will significantly affect response to turbulence; e.g., coalescence of modal response in the frequency regime which can result in a significant increase of loads. (2) The typical mission of the new airplane is substantially equivalent to that of the similar design. (3) The similar design should demonstrate the adequacy of the selected. (ii) At speed is equal to 1.32 times the values obtained under paragraph (b)(3)(i) of this appendix. (iii) At speed is equal to ½ the values obtained under paragraph (b)(3)(i) of this appendix. (iv) At speeds between VB and VC and between VC and is equal to a value obtained by linear interpolation. (4) When a stability augmentation system is included in the analysis, the effect of system nonlinearities on loads at the limit load level must be realistically or conservatively accounted for.		

(c) Mission analysis. Limit loads must be determined in accordance with the following: (1) The expected utilization of the airplane must be represented by one or more flight profiles in which the load distribution and the variation with time of speed, altitude, gross weight, and center of gravity position are defined. These profiles must be divided into mission segments or blocks, for analysis, and average or effective values of the pertinent parameters defined for each segment. (2) For each of the mission segments defined under paragraph (c)(1) of this appendix, values of and No must be determined by analysis. is defined as the ratio of root-mean-square incremental load to root-mean-square gust velocity and No is the radius of gyration of the load power spectral density function about zero frequency. The power spectral density of the atmospheric turbulence must be given by the equation set forth in paragraph (b)(2) of this appendix. (3) For each of the load and stress quantities selected, the frequency of exceedance must be determined as a function of load level by means of the equation-- $N_{(y)} = \sum t N_o \left[P_1 \exp\left(- \frac{\lvert y - y_{one-g} \rvert}{b_1 \bar{A}} \right) + P_2 \exp\left(- \frac{\lvert y - y_{one-g} \rvert}{b_2 \bar{A}} \right) \right]$ where--		

t = selected time interval. y = net value of the load or stress. Yone=g = value of the load or stress in one-g level flight. N(y) = average number of exceedances of the indicated value of the load or stress in unit time. = symbol denoting summation over all mission segments. No, = parameters determined by dynamic analysis as defined in paragraph (c)(2) of this appendix. P1, P2, b1, b2 = parameters defining the probability distributions of root-mean-square gust velocity, to be read from Figures 1 and 2 of this appendix. The limit gust loads must be read from the frequency of exceedance curves at a frequency of exceedance of 2x10-5 exceedances per hour. Both positive and negative load directions must be considered in determining the limit loads. (4) If a stability augmentation system is utilized to reduce the gust loads, consideration must be given to the fraction of flight time that the system may be inoperative. The flight profiles of paragraph (c)(1) of this appendix must include flight with the system inoperative for this fraction of the flight time. When a stability augmentation system is included in the analysis, the effect of system nonlinearities on loads at the		

limit load level must be conservatively accounted for. (d) Supplementary design envelope analysis. In addition to the limit loads defined by paragraph (c) of this appendix, limit loads must also be determined in accordance with paragraph (b) of this appendix, except that— (1) In paragraph (b)(3)(i) of this appendix, the value of fps true gust velocity is replaced by fps true gust velocity on the interval 0 to 30,000 ft. altitude, and is linearly decreased to 25 fps true gust velocity at 80,000 ft. altitude; and (2) In paragraph (b) of this appendix, the reference to paragraphs (b)(3)(i) through (b)(3)(iii) of this appendix is to be understood as referring to the paragraph as modified by paragraph (d)(1).		

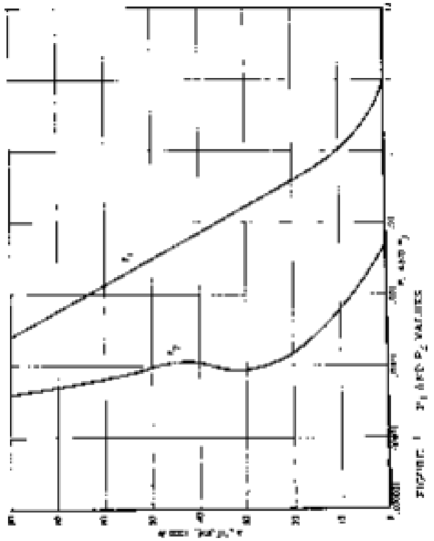


Figure 1. P1 and P2 Values

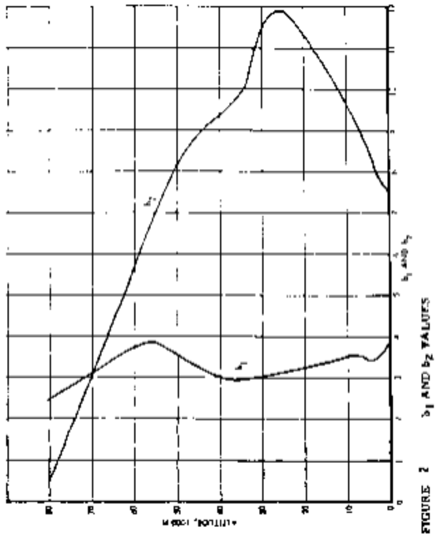


Figure 2. b1 and b2 Values