

REGULAMENTO BRASILEIRO DA AVIAÇÃO CIVIL

RBAC nº 60

EMENDA nº 00

Título: **REQUISITOS PARA QUALIFICAÇÃO E USO DE
DISPOSITIVOS DE TREINAMENTO PARA SIMULAÇÃO
DE VOO**

**REQUIREMENTS FOR QUALIFICATION AND USE OF
FLIGHT SIMULATION TRAINING DEVICE**

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PREAMBLE

This regulation is published in Portuguese and in English, formatted in two columns, on the right is the Portuguese text and on the left is the English version. The Portuguese text is the official.

PREÂMBULO

Este regulamento é publicado em língua portuguesa e em língua inglesa, formatado em duas colunas, a da direita em português e a da esquerda em inglês, sendo o texto em português o texto oficial.

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60.1 Applicability

(a) This regulation prescribes the rules governing the initial and continuing qualification and use of all aircraft flight simulation training devices (FSTD) used for meeting training, evaluation, or flight experience requirements of any RBAC.

(b) This regulation is applied to each person or organization using or applying to use a FSTD to meet any requirement established in a RBAC.

(c) This regulation does not apply to those FSTD classified as aviation training device (ATD), as defined in paragraph (c)(16) of section 60.3 of this regulation.

60.3 Definitions

(a) In the scope of this regulation are valid all definitions contained in RBAC 01 and RBHA 91, or RBAC that could be substitute it.

(b) This regulation uses terms and definitions in the English language understanding that they are widely used by the industry and sponsors.

(c) For purposes of this regulation, the following definitions and expressions are used:

(1) *Special evaluation.* A FSTD evaluation for purposes other than initial, upgrade or continuing qualification.

(2) *Predicted data.* Estimations or extrapolations of existing flight test data or data from other simulation models using engineering analyses, engineering simulations, design data, or wind tunnel data.

(3) *Statement of Compliance (SOC).* A declaration that a specific requirement has been met and explaining how the requirement was met.

(4) *Flight simulation training device (FSTD).* A full flight simulator (FFS), a flight

60.1 Aplicabilidade

(a) Este regulamento estabelece as regras de qualificação inicial e recorrente e do uso de dispositivos de treinamento para simulação de voo (FSTD) utilizados para cumprir os requisitos de treinamento, exames de proficiência ou experiência de voo estabelecidos em um RBAC.

(b) Este regulamento se aplica a pessoas ou organizações que utilizem ou que solicitem utilizar um FSTD para cumprir qualquer requisito estabelecido em um RBAC.

(c) Este regulamento não se aplica aos FSTD classificados como treinador de voo por instrumentos (ATD), conforme definido no parágrafo (c)(16) da seção 60.3 deste Regulamento.

60.3 Definições

(a) No escopo deste regulamento são válidas todas as definições contidas no RBAC nº 01 e no RBHA 91, ou RBAC que venha a substituí-lo.

(b) Este RBAC utiliza termos e definições na língua inglesa por entender que estes já são amplamente utilizados pela indústria e operadores.

(c) Para os propósitos deste regulamento, são válidas as seguintes definições e expressões:

(1) *Avaliação especial.* Uma avaliação de FSTD para propósitos outros do que inicial, elevação de nível ou recorrente.

(2) *Dados estimados.* Estimativas ou extrapolações de dados de ensaio em voo, ou dados de outros modelos de simulação utilizando análises e simulações de engenharia, dados de projeto ou de túnel de vento.

(3) *Declaração de conformidade (SOC).* Uma declaração atestando que um requisito específico é cumprido e como ele é cumprido.

(4) *Dispositivo de treinamento para simulação de voo (FSTD).* Um simulador de

training device (FTD) or an aviation training device (ATD).

(5) *Flight training device (FTD)*. A replica of aircraft instruments, equipment, panels, and controls in an open flight deck area or an enclosed aircraft flight deck replica. It includes the equipment and computer programs necessary to represent aircraft (or set of aircraft) operations in ground and flight conditions having the full range of capabilities of the systems installed in the device as described in this RBAC and the qualification performance standard (QPS) for a specific FTD qualification level.

(6) *Qualification Test Guide (QTG)*. The primary reference document used for evaluating an aircraft FSTD. It contains test results, statements of compliance and capability, the configuration of the aircraft simulated and other information for the evaluator to assess the FSTD against the applicable regulatory criteria.

(7) *Master Qualification Test Guide (MQTG)*. The ANAC-approved Qualification Test Guide with the addition of the ANAC-witnessed test results, applicable to each individual FSTD.

(8) *Sponsor*. A certificate holder who seeks or maintains FSTD qualification and is responsible for the prescribed actions as prescribed in this regulation.

(9) *Approved training program*. An ANAC-approved training program or course for an aircraft of a certificate holder or a public body.

(10) *Management representative*. A person designated by the sponsor to serve as the primary contact point for all matters between the sponsor and the ANAC.

(11) *Qualification Performance Standard (QPS)*. The collection of procedures and criteria used when conducting objective

voo (FFS), um dispositivo de treinamento de voo (FTD) ou um treinador de voo por instrumentos (ATD).

(5) *Dispositivo de treinamento de voo (FTD)*. Consiste em uma réplica dos instrumentos, equipamentos, painéis e controles de uma aeronave em uma área confinada ou não da cabine de pilotagem. Inclui os equipamentos e programas necessários para representar a operação da aeronave em solo e em voo, tendo toda a capacidade dos sistemas instalados no dispositivo conforme descrito neste RBAC e nos requisitos de desempenho para qualificação (QPS) para um nível específico de qualificação de FTD.

(6) *Guia de Testes de Qualificação (QTG)*. Documento primário de referência utilizado para avaliar um FSTD de uma aeronave. Contém os resultados de testes, declarações de conformidade e capacidade, a configuração da aeronave simulada e outras informações para o avaliador julgar o FSTD de acordo com os critérios regulatórios aplicáveis.

(7) *Guia Mestre de Testes de Qualificação (MQTG)*. O Guia de Testes de Qualificação, aprovado pela ANAC, adicionado dos resultados dos testes presenciados pela ANAC, aplicável a cada FSTD individual.

(8) *Operador de FSTD*. Um detentor de certificado que solicita ou possui um FSTD qualificado, responsável pelas atribuições impostas por este regulamento.

(9) *Programa de treinamento aprovado*. Programa de treinamento ou curso de uma aeronave, aprovado pela ANAC, para um detentor de certificado ou órgão público.

(10) *Representante do operador*. Pessoa designada pelo operador para ser o contato primário para todos os assuntos entre o operador e a ANAC.

(11) *Requisitos de Desempenho para Qualificação (QPS)*. Conjunto de procedimentos e critérios utilizados na

and subjective tests, to establish FSTD qualification levels.

(12) *Full flight simulator (FFS)*. A replica of a specific type, make, model, or series aircraft. It includes the equipment and software necessary to represent aircraft operations in ground and flight conditions, and has the full range of capabilities of the systems installed in the device as described in this RBAC and the QPS for a specific FFS qualification level.

(13) *Quality management system (QMS)*. A flight simulation quality-systems that can be used for external quality-assurance purposes. It is designed to identify the processes needed; determine the sequence and interaction of the processes; determine criteria and methods required to ensure the effective operation and control of the processes; ensure the availability of information necessary to support the operation and monitoring of the processes; measure, monitor and analyze the processes; and implement the actions necessary to achieve planned results.

(14) *Objective test*. A quantitative measurement and evaluation of FSTD performance.

(15) *Subjective test*. A qualitative assessment of the performance and operation of the FSTD.

(16) *Aviation training device (ATD)*. A device designed to simulate an instrument flight in a class aircraft.

(17) *FSTD use* means use, permit the use or offer the use of a FSTD in order to fulfill requirements of flight training, proficiency exam or obtaining flight experience to comply with any RBAC requirements.

condução de testes objetivos e subjetivos, para estabelecer níveis de qualificação de FSTD.

(12) *Simulador de voo (FFS)*. Consiste em uma réplica dos instrumentos, equipamentos, painéis e controles do tipo específico ou do modelo e série de uma aeronave. Inclui os equipamentos e programas necessários para representar a operação da aeronave em solo e em voo, tendo toda a capacidade dos sistemas instalados no dispositivo conforme descrito neste regulamento e no QPS para um nível específico de qualificação de FFS.

(13) *Sistema de gerenciamento da qualidade (QMS)*. Um sistema de qualidade que pode ser utilizado para propósitos de garantia da qualidade em auditorias externas. É concebido para identificar a necessidade de processos específicos; determinar a sequência e interação entre os processos; determinar os critérios e métodos para garantir a efetiva operação e controle dos processos; garantir a disponibilidade da informação para suportar a operação e monitorar os processos; mensurar, monitorar e analisar os processos; e implementar as ações necessárias para alcançar os resultados planejados.

(14) *Testes objetivos*. Consiste em uma medida e avaliação quantitativa do desempenho de um FSTD.

(15) *Testes subjetivos*. Consiste em uma análise qualitativa do desempenho e operação de um FSTD.

(16) *Treinador de voo por instrumento (ATD)*. Dispositivo com o qual é possível simular a operação de uma aeronave classe em um voo por instrumentos.

(17) *Utilizar um FSTD*. Utilizar, permitir o uso ou oferecer o uso de um FSTD com o fim de cumprir requisitos de treinamento de voo, exame de proficiência ou para obtenção de experiência de voo de tripulantes, para cumprir qualquer requisito estabelecido em um RBAC.

60.4 Qualification performance standards (QPS)

(a) The Qualification Performance Standards are published in appendices to this RBAC as follows:

(1) Appendix A contains the QPS for Airplane Flight Simulators.

(2) Appendix B contains the QPS for Airplane Flight Training Devices.

(3) Appendix C contains the QPS for Helicopter Flight Simulators.

(4) Appendix D contains the QPS for Helicopter Flight Training Devices.

60.5 Quality management system (QMS)

(a) A sponsor may use a FSTD only if the sponsor has established and follows a QMS, currently approved by the ANAC, for the continuing surveillance and analysis of the sponsor's performance and effectiveness in providing a satisfactory FSTD for use on a regular basis. The QMS must comply with the determination of Appendix E of this RBAC.

(b) The QMS program must provide, besides a process for identifying deficiencies in the system, a process for documenting how the QMS will be changed to address these deficiencies.

(c) Whenever the ANAC finds that the QMS program does not adequately address the procedures necessary to meet the requirements of this RBAC, the sponsor must, after notification by the ANAC, change the program in order to the procedures meet the requirements of this RBAC. Each such change must be approved by the ANAC prior to implementation.

60.7 Sponsor requirements

(a) An organization is eligible to apply to be a sponsor if the following conditions are met:

60.4 Requisitos de desempenho para qualificação (QPS)

(a) Os requisitos de desempenho para qualificação são publicados em apêndices deste regulamento:

(1) O Apêndice A contém o QPS para Simulador de Voo de Avião.

(2) O Apêndice B contém o QPS para Dispositivo de Treinamento de Voo de Avião.

(3) O Apêndice C contém o QPS para Simulador de Voo de Helicóptero

(4) O Apêndice D contém o QPS para Dispositivo de Treinamento de Voo de Helicóptero

60.5 Sistema de gerenciamento da qualidade (QMS)

(a) Um operador somente poderá utilizar um FSTD se este operador tiver estabelecido e seguir um QMS, aprovado pela ANAC, para monitorar e analisar continuamente a capacidade do operador em disponibilizar um FSTD satisfatório para uso frequente. O QMS deve cumprir o determinado no Apêndice E deste RBAC

(b) O QMS deve prover, além de um processo de identificação de deficiências do sistema, um processo para documentar como o QMS será modificado para sanar estas deficiências.

(c) Sempre que a ANAC julgar que o QMS não garante procedimentos adequados para o cumprimento dos requisitos deste regulamento, o operador deverá, após ser notificado pela ANAC, alterar o QMS para que ele atenda os requisitos deste regulamento. Cada alteração deve ser aprovada pela ANAC antes de ser adotada.

60.7 Requisitos para o operador de FSTD

(a) Uma organização é elegível a ser um operador de FSTD se as seguintes condições forem cumpridas:

(1) the organization holds, or is an applicant for, a certificate under RBAC 119, 141, or 142; and

(2) the FSTD will be used in the sponsor's ANAC-approved training program for the aircraft being simulated.

(b) An organization is a sponsor if the following conditions are met:

(1) the organization is a certificate holder under RBAC 119, 141, or 142;

(2) the organization has an ANAC-approved training program for an aircraft or set of aircraft and at least one FSTD, sponsored by the organization, is used within this training program, at least once every 12 months;

(3) the organization has a QMS currently approved by the ANAC in accordance with section 60.5 of this regulation; and

(4) ANAC has accepted the organization as the sponsor of the FSTD and that acceptance has not been revoked by the ANAC.

(c) In addition to the FSTD described in paragraph (b)(2) of this section, a sponsor may sponsor any number of other FSTDs regardless of specific aircraft or set of aircraft provided either:

(1) all of the other FSTDs are used within the sponsor's or another certificate holder's ANAC-approved training program for the aircraft, at least once every 12 months; or

(2) the sponsor obtains a written statement at least annually from a qualified pilot who has flown the aircraft or set of aircraft (as appropriate) during the preceding 12-month period stating that the subject FSTD's performance and handling qualities, within the normal operating envelope, represent the simulated aircraft or set of aircraft. The sponsor must retain the two most

(1) a organização possuir, ou for um requerente para possuir, um certificado conforme o RBAC nº 119, 141 ou 142; e

(2) o FSTD for utilizado no programa de treinamento aprovado pela ANAC do operador, para a aeronave simulada.

(b) Uma organização é um operador de FSTD se as seguintes condições forem cumpridas:

(1) a organização for detentora de um certificado conforme o RBAC nº 119, 141 ou 142;

(2) a organização possuir um programa de treinamento aprovado pela ANAC para uma aeronave ou conjunto de aeronaves e, pelo menos um FSTD, operado pela organização, for utilizado neste programa de treinamento, pelo menos uma vez a cada 12 meses;

(3) a organização possuir um QMS aprovado pela ANAC de acordo com a seção 60.5 deste regulamento; e

(4) a ANAC aceitou a organização como operador do FSTD e esta aceitação não foi revogada pela ANAC.

(c) Adicionalmente ao FSTD descrito no parágrafo (b)(2) desta seção, um operador de FSTD pode operar quaisquer outros FSTDs, independentemente da aeronave simulada, desde que:

(1) todos os outros FSTDs sejam utilizados dentro do programa de treinamento aprovado pela ANAC, do operador do FSTD ou de outro detentor de certificado, para a aeronave simulada, pelo menos uma vez a cada 12 meses; ou

(2) o operador obtenha uma declaração escrita a cada 12 meses, de um piloto qualificado que tenha voado a aeronave ou conjunto de aeronaves (como apropriado) nos 12 meses precedentes, atestando que o desempenho e a qualidade de voo do FSTD representam a aeronave ou conjunto de aeronaves simuladas. O operador deve manter

current written statements for review by the ANAC.

(d) A public administration body is eligible to be a sponsor and will be considered as sponsor if the following conditions are met:

(1) the public body has an ANAC-approved training program for an aircraft or set of aircraft and at least one FSTD, sponsored by the body, is used within this training program, at least once every 12 months; and

(2) the public body has a QMS currently approved by the ANAC in accordance with section 60.5 of this regulation.

60.9 Additional responsibilities of the sponsor

(a) The sponsor must allow ANAC upon request to inspect the FSTD as soon as practicable. This inspection may include all records and documents relating to the FSTD, to determine its compliance with the regulations.

(b) The sponsor must do the following for each FSTD:

(1) establish a mechanism to receive written reports regarding the FSTD and its operation in accordance with the approved sponsor's QMS; and

(2) post in or adjacent to the FSTD the Statement of Qualification issued by the ANAC. An electronic copy of the Statement of Qualification that may be accessed by an appropriate terminal or display in or adjacent to the FSTD is satisfactory.

(c) Each sponsor must identify to the ANAC a person to be the management representative.

(1) One person may serve as a management representative for more than one FSTD, but one FSTD must not have more than one person serving in this function.

as duas últimas declarações escritas para consulta da ANAC.

(d) Um órgão da administração pública é elegível a ser um operador de FSTD e será considerado um operador de FSTD se as seguintes condições forem cumpridas:

(1) o órgão público possuir um programa de treinamento aprovado pela ANAC para uma aeronave ou conjunto de aeronaves e, pelo menos um FSTD, operado pelo órgão, for utilizado neste programa de treinamento, pelo menos uma vez a cada 12 meses; e

(2) o órgão público possuir um QMS, aprovado pela ANAC de acordo com a seção 60.5 deste regulamento.

60.9 Responsabilidades adicionais do operador

(a) O operador, quando solicitado, deve permitir à ANAC realizar inspeções no FSTD tão logo quanto praticável. Esta inspeção pode incluir todos os registros e documentos relacionados ao FSTD, para verificação dos requisitos vigentes.

(b) Para cada FSTD, o operador deve:

(1) estabelecer um mecanismo para receber relatos escritos sobre o FSTD e sua operação, de acordo com o QMS aprovado; e

(2) fixar no FSTD ou em local adjacente, o Certificado de Qualificação emitido pela ANAC. Uma cópia eletrônica do Certificado de Qualificação que possa ser acessada no FSTD ou em local adjacente é aceitável.

(c) Cada operador de FSTD deve indicar à ANAC uma pessoa que será o representante do operador.

(1) Uma pessoa pode ser o representante do operador de mais de um FSTD, mas um FSTD não pode ter mais de uma pessoa atuando nesta função.

(2) The management representative must be a person related to the sponsor and must have the responsibility and authority to:

(i) monitor the on-going qualification of assigned FSTDs to ensure that all matters regarding FSTD qualification are being carried out as provided for in this RBAC;

(ii) ensure that the QMS is properly established, implemented and maintained; and

(iii) regularly brief the sponsor's management on the status of the on-going FSTD qualification program and the effectiveness and efficiency of the QMS.

(3) The management representative serves as the primary contact point for all matters between the sponsor and the ANAC regarding the qualification of that FSTD as provided for in this RBAC.

(4) The management representative may delegate the duties described in paragraph (c)(2) and (c)(3) of this section to an individual at each of the sponsor's locations.

60.11 FSTD use

(a) A person may use a FSTD only if the FSTD::

(1) has a single sponsor who is qualified under section 60.7 of this regulation. The sponsor may arrange with another person for services of document preparation and presentation, as well as FSTD inspection, maintenance, repair or servicing; however, the sponsor remains responsible for ensuring that these functions are conducted in a manner and with a result of continually meeting the requirements of this regulation;

(2) is qualified as described in the Statement of Qualification;

(2) O representante do operador deve ser uma pessoa vinculada à organização e deve possuir a responsabilidade e autoridade para:

(i) monitorar a qualificação em andamento do FSTD a ele designado para garantir que todos os aspectos referentes à qualificação do FSTD estão sendo conduzidos de acordo com as disposições deste regulamento;

(ii) garantir que o QMS seja propriamente estabelecido, executado e mantido; e

(iii) regularmente informar à gerência do operador sobre a situação da qualificação vigente do(s) FSTD(s) e da efetividade do QMS.

(3) O representante do operador é o contato primário para todos os assuntos entre o operador e a ANAC que dizem respeito à qualificação daquele FSTD conforme disposto neste regulamento.

(4) O representante do operador poderá delegar a terceiros as atribuições descritas nos parágrafos (c)(2) e (c)(3) desta seção em cada uma das localidades em que opera.

60.11 Uso do FSTD

(a) Uma pessoa somente pode utilizar um FSTD se este::

(1) tiver um único operador que seja qualificado conforme a seção 60.7 deste regulamento. O operador pode utilizar serviços de terceiros para preparação e apresentação de documentação, bem como para inspecionar, realizar manutenção, reparo ou auxílio técnico ao FSTD; entretanto, o operador permanece responsável por garantir que estas atribuições sejam conduzidas de forma a manter o cumprimento dos requisitos deste regulamento;

(2) estiver qualificado conforme descrito no seu Certificado de Qualificação;

(3) remains qualified, through satisfactory inspection, continuing qualification evaluations, appropriate maintenance, and is available for use in accordance with the requirements of this regulation;

(4) use the software and hardware that were evaluated as satisfactory by the ANAC and, if modified, modified only in accordance with the provisions of this regulation. However, this section does not apply to routine software or hardware changes that do not fall under the requirements of section 60.23 of this regulation; and

(5) is operated in accordance with the provisions and limitations of section 60.25 of this regulation.

60.13 FSTD objective data requirements

(a) Except as provided in paragraph (b) and (c) of this section, for the purposes of validating FSTD performance and handling qualities during evaluation for qualification, the data made available to the ANAC (the validation data package) must include the aircraft manufacturer's flight test data and all relevant data developed after the type certificate was issued (for example, data developed in response to an airworthiness directive) if such data results affect the performance, handling qualities, functions, or other characteristics of the aircraft.

(b) The validation data package may contain flight test data from a source in addition to or independent of the aircraft manufacturer's data in support of a FSTD qualification, but only if this data is gathered and developed by that source in accordance with flight test methods, including a flight test plan.

(c) The validation data package may also contain predicted data, engineering simulation data, data from pilot owner or pilot operating

(3) permanecer qualificado, por meio de inspeções satisfatórias, avaliações recorrentes, manutenção apropriada e for disponibilizado para uso conforme os requisitos deste regulamento;

(4) utilizar o *software* e o *hardware* que foram avaliados como satisfatórios pela ANAC e, se modificado, modificado somente conforme as disposições deste regulamento. Entretanto, este item não se aplica para mudanças rotineiras de *software* ou *hardware* que não se enquadrem nos requisitos da seção 60.23 deste regulamento; e

(5) for operado de acordo com as provisões e limitações da seção 60.25 deste regulamento.

60.13 Requisitos de dados objetivos do FSTD

(a) Exceto como previsto nos parágrafos (b) e (c) desta seção, a fim de validar o desempenho e as características do FSTD durante a avaliação de qualificação, os dados da aeronave disponibilizados para a ANAC (pacote de dados de validação) devem incluir os dados de ensaio em voo do fabricante da aeronave e todos os dados relevantes desenvolvidos após a emissão do certificado de tipo da aeronave (por exemplo, dados desenvolvidos em resposta a uma diretriz de aeronavegabilidade) se estes dados afetarem o desempenho, a qualidade de voo, as funcionalidades ou outras características da aeronave.

(b) O pacote de dados de validação para basear uma qualificação de FSTD pode conter dados de ensaio em voo de uma fonte adicional ou independente dos dados do fabricante da aeronave, mas apenas se estes dados forem obtidos e desenvolvidos por esta fonte de acordo com os métodos de ensaio em voo, incluindo um plano de ensaio em voo.

(c) O pacote de dados de validação também pode conter dados estimados, dados de simulação de engenharia, dados dos

manuals, or data from public domain sources, provided this data is acceptable to the ANAC. If found acceptable the data may then be used in particular applications for FSTD qualification.

(d) Data or other material or elements must be submitted in a form and manner acceptable to ANAC.

(e) ANAC may require additional objective data, which may include, if necessary, flight testing, if the validation data package does not support FSTD qualification requirements as described in this regulation for the intended qualification level.

(f) When a FSTD sponsor learns, or is advised by an aircraft manufacturer or other data provider, that an addition to, an amendment to, or a revision of data that may relate to FSTD performance or handling characteristics is available, ANAC must be notified by the sponsor.

60.14 Special equipment and personnel requirements for qualification of the FSTD

(a) When notified by the ANAC, the sponsor must make available all special equipment and qualified personnel needed to accomplish or assist in the accomplishment of tests during initial qualification, continuing qualification, or special evaluations.

60.15 Initial qualification requirements

(a) For each FSTD, the sponsor must submit, with 90 days in advance, a request to ANAC to evaluate the FSTD for initial qualification at a specific level, which must be confirmed by ANAC. The request must be submitted in the form and manner determined by ANAC.

manuals do proprietário ou de operação da aeronave, ou dados de outras fontes públicas, desde que estes dados sejam aceitáveis pela ANAC. Se considerados aceitáveis, os dados poderão ser utilizados em casos específicos para a qualificação do FSTD.

(d) Os dados de validação ou qualquer outro material devem ser submetidos em um formato aceitável pela ANAC.

(e) A ANAC poderá exigir dados de validação adicionais, que podem incluir, se necessário, ensaio em voo, caso o pacote de dados de validação apresentado não atenda os requisitos de qualificação do FSTD, conforme requerido por este regulamento para o nível de qualificação pretendido.

(f) Quando o operador de um FSTD souber, ou for avisado pelo fabricante da aeronave, ou por outro provedor de dados, que existe uma adição, emenda, ou uma revisão dos dados de validação, que possam impactar as características de desempenho ou qualidade de voo do FSTD, o operador deverá notificar a ANAC.

60.14 Requisitos de equipamentos especiais e de pessoal para qualificação de FSTD

(a) Quando solicitado pela ANAC, o operador deve disponibilizar todos os equipamentos especiais e pessoal qualificado necessários para realizar ou auxiliar na realização dos testes durante a qualificação inicial, qualificação recorrente ou avaliações especiais do FSTD.

60.15 Requisitos para qualificação inicial

(a) Para cada FSTD, o operador deve enviar à ANAC uma solicitação de avaliação do FSTD para qualificação inicial em um nível específico com antecedência mínima de 90 dias à data de avaliação pretendida, cuja confirmação dar-se-á de acordo com a disponibilidade da ANAC. A solicitação deve

(b) The management representative, described in the paragraph 60.9(c) of this regulation, must sign a statement stating the following:

(1) the performance and handling qualities of the FSTD represent those of the aircraft or set of aircraft within the normal operating envelope. This statement must be made by a qualified pilot in the aircraft or set of aircraft being simulated after having flown all of the Operations Tasks listed in the QPS relevant to the qualification level of the FSTD;

(2) the FSTD systems and sub-systems (including the simulated aircraft systems) functionally represent those in the aircraft or set of aircraft. This statement must be made by a qualified pilot in the aircraft or set of aircraft being simulated or by a person trained on simulator systems/sub-systems and trained on the operation of the simulated aircraft systems; and

(3) the cockpit represents the configuration of the specific type; or aircraft make, model and series aircraft being simulated, as appropriate. This statement must be made by a qualified pilot in the aircraft or set of aircraft being simulated, or by a person trained on the configuration and operation of the aircraft simulated.

(c) Each FSTD evaluated for initial qualification must meet the qualification performance standards, as defined in section 60.4 of this regulation, that are in effect at the time of the evaluation. The exceptions are:

(1) if the ANAC publishes a change to the existing standard or publishes a new standard for the evaluation for initial qualification, a sponsor may request that the ANAC apply the standard that was in effect when a FSTD was ordered for delivery. In this

ser feita no formato e na maneira determinada pela ANAC.

(b) O representante do operador, descrito no parágrafo 60.9(c) deste regulamento, deve providenciar declaração assinada afirmando que:

(1) o desempenho e a qualidade de voo do FSTD representam aqueles da aeronave ou conjunto de aeronaves sendo simulada dentro do seu envelope normal de operação. Esta declaração deve ser feita por um piloto qualificado na aeronave ou conjunto de aeronaves sendo simulada após ter realizado todas as tarefas operacionais listadas no QPS relevante ao nível de qualificação pretendido do FSTD;

(2) os sistemas e subsistemas do FSTD (incluindo os sistemas simulados da aeronave) representam o funcionamento daqueles da aeronave ou conjunto de aeronaves. Esta declaração deve ser feita por um piloto qualificado na aeronave ou conjunto de aeronaves sendo simulada, ou por uma pessoa treinada em sistemas e subsistemas de FSTDs e treinada na operação dos sistemas da aeronave simulada; e

(3) a cabine de comando representa a configuração do tipo específico ou do modelo e série da aeronave sendo simulada, como apropriado. Esta declaração deve ser feita por um piloto qualificado na aeronave ou conjunto de aeronaves sendo simulada, ou por uma pessoa treinada em configuração e operação da aeronave simulada.

(c) Cada FSTD avaliado para qualificação inicial deve cumprir os requisitos de desempenho para qualificação, definidos na seção 60.4 deste regulamento, que estiverem em vigor na época da avaliação. As exceções são:

(1) caso a ANAC publique uma revisão ao requisito existente ou publique um novo requisito para qualificação inicial, um operador que já tiver encomendado um FSTD poderá solicitar que a ANAC utilize o requisito que estava em vigor à época da

case, the evaluation must be conducted within 24 months following the publication of the change to the existing standard or publication of the new standard; and

(2) an FSTD manufactured before the publication of this regulation and which is qualified by the aviation authority of a contracting State to the Convention on International Civil Aviation may be evaluated for initial qualification in accordance to its original qualification basis, provided it is authorized by ANAC.

(d) The standards used for the evaluation for initial qualification will be used for all subsequent evaluations of the FSTD.

(e) The subjective tests that form the basis for the statements described in paragraph (b) of this section and the objective tests referenced in paragraph (f) of this section must be accomplished at the sponsor's training facility.

(f) The organization seeking to qualify the FSTD must provide the ANAC access to the FSTD for the length of time necessary for the ANAC to complete the required evaluation of the FSTD for initial qualification, which includes the conduct and evaluation of objective and subjective tests, including general FSTD requirements, as described in the QPS, to determine that the FSTD meets the standards for the qualification level sought.

(g) When the FSTD an evaluation for initial qualification is succeeded, the ANAC issues a Statement of Qualification that includes all of the following:

- (1) the identification of the sponsor;
- (2) the identification of the make, model, and series of the aircraft or set of aircraft being simulated;
- (3) the identification of the configuration of the aircraft or set of aircraft being simulated (e.g., engine model or models, flight instruments, or navigation or other systems);

encomenda. Neste caso, a avaliação deverá ocorrer em até 24 meses contados a partir da publicação da revisão do requisito, ou da publicação do novo requisito; e

(2) um FSTD fabricado anteriormente à data de publicação deste regulamento e que esteja qualificado por autoridade aeronáutica de um país signatário da Convenção de Aviação Civil Internacional poderá ser avaliado para qualificação inicial, de acordo com os requisitos estabelecidos na sua base de qualificação original, desde que autorizado pela ANAC.

(d) Os requisitos utilizados na avaliação para qualificação inicial serão utilizados para todas as avaliações subsequentes do FSTD.

(e) Os testes subjetivos que compõem a declaração descrita no parágrafo (b) desta seção e os testes objetivos realizados para atender aos requisitos do parágrafo (f) desta seção devem ser realizados na localidade permanente onde o FSTD será operado.

(f) A organização que pretende ter o FSTD qualificado deve prover à ANAC acesso ao FSTD pelo tempo necessário para completar a avaliação do FSTD para qualificação inicial, o que inclui a realização de testes objetivos, subjetivos e funcionais, bem como a verificação de requisitos gerais de FSTD, conforme descrito no QPS, para determinar que o FSTD cumpre todos os requisitos aplicáveis ao nível de qualificação pretendido.

(g) Quando uma avaliação de qualificação inicial de FSTD é concluída com sucesso, a ANAC emite um Certificado de Qualificação que inclui o seguinte:

- (1) a identificação do operador;
- (2) a identificação do fabricante, modelo e série da aeronave ou conjunto de aeronaves sendo simuladas;
- (3) a identificação da configuração da aeronave ou conjunto de aeronaves sendo simuladas (ex: modelo ou modelos do motor, instrumentos de voo, sistemas de navegação);

(4) a statement that the FSTD is qualified as either a FTD or a FFS;

(5) the identification of the qualification level of the FSTD;

(6) a statement that the qualification of the FSTD includes the tasks set out in the QPS relevant to the qualification level of the FSTD with the exception of those tasks not evaluated or considered unsatisfactory by ANAC; and

(7) a statement referencing any deviations that have been granted and included in the permanent qualification basis of the FSTD.

(h) After ANAC completes the evaluation for initial qualification, the sponsor must update the Qualification Test Guide (QTG), with the results of the ANAC-witnessed.

(i) Upon issuance of the Statement of Qualification the updated QTG becomes the Master Qualification Test Guide (MQTG). The MQTG must be made available to ANAC upon request.

60.16 Additional qualifications for a currently qualified FSTD

(a) A currently qualified FSTD is required to undergo an additional qualification process if a user intends to use the FSTD beyond the qualification issued for that FSTD. This process consists of the following:

(1) the sponsor must:

(i) submit to ANAC all modifications to the MQTG that are required to support the additional qualification;

(ii) describe to ANAC all modifications to the FSTD that are required to support the additional qualification; and

(iii) submit to ANAC a statement, as described in paragraph 60.15(b) of this regulation, that a rated and qualified pilot in the aircraft or set of aircraft being simulated has subjectively evaluated the FSTD in those areas not previously evaluated; and

(4) um certificado de que o FSTD está qualificado como FTD ou FFS;

(5) a identificação do nível de qualificação do FSTD;

(6) uma declaração de que a qualificação do FSTD inclui todas as tarefas operacionais definidas no QPS relevante ao nível de qualificação pretendido, com exceção daquelas tarefas não avaliadas ou consideradas insatisfatórias pela ANAC; e

(7) uma declaração referenciando quaisquer desvios que tenham sido concedidos e incluídos na base de qualificação permanente do FSTD.

(h) Após a ANAC concluir a avaliação para qualificação inicial, o operador deve atualizar o QTG contendo os resultados dos testes executados na presença da ANAC.

(i) Com a emissão do Certificado de Qualificação, o QTG atualizado torna-se o MQTG. O MQTG deve ser disponibilizado à ANAC quando solicitado.

60.16 Qualificações adicionais para um FSTD atualmente qualificado

(a) Um FSTD atualmente qualificado deve passar por um processo de qualificação adicional caso pretenda utilizar o FSTD além da sua qualificação original. Este processo consiste no seguinte:

(1) o operador deve:

(i) submeter à ANAC todas as modificações ao MQTG requeridas para basear a qualificação adicional;

(ii) descrever à ANAC todas as modificações ao FSTD que são requeridas para basear a qualificação adicional; e

(iii) submeter à ANAC uma declaração, como descrita no parágrafo 60.15(b) deste regulamento, que um piloto habilitado e qualificado na aeronave ou conjunto de aeronaves sendo simulada

(2) the FSTD must successfully pass an evaluation as determined by ANAC.

(b) In determining the criteria of the evaluation mentioned in paragraph (a)(2) of this section, ANAC considers factors such as the existing qualification of the FSTD, any modifications to the FSTD hardware or software that are involved, and any additions or modifications to the MQTG, among others.

(c) The FSTD is qualified for the additional uses when ANAC issues an amended Statement of Qualification in accordance with paragraph 60.15(i) of this regulation.

(d) The sponsor may only modify the FSTD as described in section 60.23 of this regulation.

60.17 Previously qualified FSTDs

(a) Unless otherwise specified by an FSTD directive, or as specified in paragraph (d) of this section, an FSTD qualified by ANAC before the issue of this regulation will retain its qualification basis as long as it continues to meet the standards, including the objective test results recorded in the MQTG and subjective tests, under which it was originally evaluated, regardless of sponsor. However, the sponsor of such an FSTD must comply with the other applicable provisions of this regulation.

(b) If the FSTD qualification is suspended under section 60.27 of this regulation and:

(i) restored under section 60.27 of this regulation in less than 24 months, then the qualification basis (in terms of objective tests and subjective tests) for the re-qualification will be those of which the FSTD was originally evaluated and qualified; or

avaliou subjetivamente o FSTD naquelas áreas não avaliadas anteriormente; e

(2) o FSTD deve ser aprovado em uma avaliação como determinado pela ANAC.

(b) Ao determinar os critérios para a avaliação mencionada no parágrafo (a)(2) desta seção, a ANAC considera fatores tais como a qualificação atual do FSTD, as modificações de *hardware* e *software* envolvidas, os acréscimos ou modificações ao MQTG, dentre outros.

(c) O FSTD estará qualificado para os usos adicionais quando a ANAC emitir uma revisão do Certificado de Qualificação de acordo com o parágrafo 60.15(i) deste regulamento.

(d) O operador só pode modificar o FSTD como descrito na seção 60.23 deste regulamento.

60.17 FSTDs qualificados previamente

(a) Exceto para os casos especificados em uma diretriz de FSTD, ou como especificado no parágrafo (d) desta seção, um FSTD qualificado pela ANAC anteriormente à data de publicação deste regulamento poderá manter a mesma base de qualificação utilizada à época da qualificação inicial deste FSTD, desde que os requisitos daquela base continuem sendo cumpridos, incluindo os testes objetivos do seu MQTG e os testes subjetivos, independentemente do operador. Entretanto, o operador de tal FSTD deverá adequar-se a todos os outros requisitos aplicáveis dispostos neste regulamento.

(b) Se a qualificação do FSTD for suspensa conforme seção 60.27 deste regulamento e:

(i) for restaurada conforme seção 60.27 deste regulamento em menos de 24 meses, a base de qualificação (incluindo os testes objetivos e subjetivos) para as futuras qualificações recorrentes será a mesma utilizada à época da qualificação inicial deste FSTD; ou

(ii) not restored under section 60.27 of this regulation for 24 months or more, then the FSTD will be evaluated for initial qualification in accordance with the section 60.15 of this regulation, at the time of re-qualification application.

(c) Except as provided in paragraph (d) of this section, any change in FSTD qualification level requires an evaluation for initial qualification in accordance with 60.15 of this regulation.

(d) A sponsor may request that an FSTD be permanently downgraded. In such a case, ANAC may downgrade a qualified FSTD without requiring and without conducting an initial evaluation for the new qualification level. Subsequent continuing qualification evaluations will use the existing MQTG, modified as necessary to reflect the new qualification level.

(e) When the sponsor has appropriate validation data available and receives approval from ANAC, the sponsor may adopt tests and associated tolerances described in the current qualification standards as the tests and tolerances applicable for the continuing qualification of a previously qualified FSTD. The updated test(s) and tolerance(s) must be made a permanent part of the MQTG.

60.19 Inspection, continuing qualification evaluation, and maintenance requirements

(a) Inspection. A sponsor may only use an FSTD if the sponsor does:

(1) accomplish all appropriate objective tests each year as specified in the QPS, or in the original qualification basis of the FSTD, or as may be amended by an FSTD directive; and

(2) complete a functional preflight check within the preceding 24 hours.

(b) Continuing qualification evaluation.

(ii) não for restaurada conforme seção 60.27 deste regulamento em 24 meses ou mais, então o FSTD deverá ser avaliado para qualificação inicial conforme a seção 60.15 deste regulamento, quando a requalificação for solicitada.

(c) Exceto como previsto no parágrafo (d) desta seção, qualquer mudança no nível de qualificação do FSTD requer uma avaliação para qualificação inicial conforme seção 60.15 deste regulamento.

(d) Um operador pode solicitar que um FSTD tenha o seu nível de qualificação permanentemente degradado. Neste caso, a ANAC degradará o nível de qualificação do FSTD sem a necessidade de conduzir uma avaliação para qualificação inicial. As avaliações futuras para qualificação recorrente utilizarão o MQTG existente, modificado como necessário para refletir o novo nível de qualificação.

(e) Um operador que possua dados de validação da aeronave adequados disponíveis e que receba aprovação da ANAC, poderá adotar os testes e as tolerâncias estabelecidas na base de qualificação atual como os testes e tolerâncias aplicáveis para as futuras qualificações recorrentes de um FSTD previamente qualificado. As atualizações de teste(s) e tolerância(s) deverão tornar-se parte permanente do MQTG.

60.19 Requisitos de inspeção, avaliação para qualificação recorrente e manutenção

(a) Inspeção. Um operador somente poderá utilizar um FSTD se:

(1) realizar todos os testes objetivos apropriados, progressivamente durante cada ano, conforme especificado no QPS, ou na base de qualificação original do FSTD, ou como requerido por uma diretriz de FSTD; e

(2) realizar uma inspeção pré voo funcional nas 24 horas precedentes.

(b) Avaliação para qualificação recorrente.

(1) This evaluation consists of objective tests, and subjective tests, as described in the QPS, or in the original qualification basis of the FSTD, or as may be amended by an FSTD directive.

(2) The sponsor must contact ANAC to schedule the FSTD for continuing qualification evaluations not later than 60 days before the evaluation is due, which must be confirmed by ANAC.

(3) The sponsor must provide the ANAC access to the objective test results in the MQTG and access to the FSTD for the length of time necessary to complete the required continuing qualification evaluations.

(4) The frequency of ANAC-conducted continuing qualification evaluations for each FSTD will be established by the ANAC and specified in the Statement of Qualification.

(5) Continuing qualification evaluation may occur at any time in the three months preceding the expiration date of the Statement of Qualification.

(6) No sponsor may use an FSTD unless the FSTD has passed an ANAC-conducted continuing evaluation within the period specified in the Statement of Qualification.

(c) Maintenance. The sponsor is responsible for continuing corrective and preventive maintenance on the FSTD to ensure that it continues to meet the actual requirements. The sponsor is responsible for:

(1) maintains a discrepancy log; and

(2) ensures that, when a discrepancy is found, the following requirements are met:

(i) the description of each discrepancy is included in the discrepancy log and it remains in the log until the discrepancy is

(1) Esta avaliação consiste de testes objetivos e subjetivos, como descrito pelo QPS, ou pela base de qualificação original do FSTD, ou como requerido por uma diretriz de FSTD.

(2) O operador deve entrar em contato com a ANAC para agendar a avaliação para qualificação recorrente do FSTD com pelo menos 60 dias de antecedência ao dia da avaliação pretendida, cuja confirmação dar-se-á de acordo com a disponibilidade da ANAC.

(3) O operador deve fornecer a ANAC acesso aos resultados dos testes objetivos do MQTG e acesso ao FSTD o tempo necessário para completar a avaliação para qualificação recorrente.

(4) A frequência das avaliações para qualificação recorrente conduzidas pela ANAC para cada FSTD será estabelecida pela ANAC e especificada no seu Certificado de Qualificação.

(5) A avaliação para qualificação recorrente pode ocorrer a qualquer momento nos três meses que antecedem o vencimento do Certificado de Qualificação vigente.

(6) Nenhum operador pode utilizar um FSTD a menos que o FSTD tenha passado por uma avaliação para qualificação recorrente, conduzida pela ANAC, dentro do período especificado no seu Certificado de Qualificação.

(c) Manutenção. O operador é responsável pela manutenção corretiva e preventiva do FSTD a fim de garantir o cumprimento dos requisitos vigentes. O operador é responsável por:

(1) manter o registro das discrepâncias;
e

(2) garantir que, quando encontrada uma discrepância, as seguintes providências sejam tomadas:

(i) seja incluída no registro a descrição da discrepância e esta permaneça no registro até que seja corrigida conforme

corrected as specified in paragraph 60.25(b) of this regulation;

(ii) the description of the corrective action taken, the identity of the individual who made the correction and the date that the corrective action was taken is included in the discrepancy log; and

(iii) the discrepancy log is kept in a form and manner acceptable by ANAC, within the FSTD or in an adjacent location. An electronic register that can be accessed by a computer or display located in the FSTD or in an adjacent location is acceptable.

60.20 Logging FSTD discrepancies

(a) Each instructor, check airman, or representative of the ANAC conducting training, evaluation, or flight experience, and each person conducting the preflight inspection who finds out a discrepancy, any missing, malfunctioning, or inoperative components in the FSTD, must include or cause to be included a description of that discrepancy into the discrepancy log.

60.21 Interim qualification of FSTDs for new aircraft types or models

(a) A sponsor may apply for and ANAC may issue an interim qualification level for an FSTD for a new type or model of aircraft, even though the aircraft manufacturer's aircraft data package is preliminary, if the sponsor provides the following to the satisfaction of ANAC:

(1) the aircraft manufacturer's data, which consists of at least predicted data, validated by a limited set of flight test data;

(2) the aircraft manufacturer's description of the prediction methodology used to develop the predicted data; and

(3) the QTG test results.

especificado no parágrafo 60.25(b) deste regulamento;

(ii) seja incluída no registro a ação corretiva adotada, a identificação do autor da correção e a data em que ela ocorreu; e

(iii) que o registro de discrepâncias seja mantido em uma forma aceitável pela ANAC, dentro do FSTD ou em local adjacente. Um registro eletrônico que possa ser acessado por um terminal ou monitor localizado no FSTD ou em local adjacente é aceitável.

60.20 Registro de discrepâncias do FSTD

(a) Cada instrutor, examinador credenciado ou servidor da ANAC conduzindo ou acompanhando treinamento, avaliação ou experiência de voo, e cada pessoa conduzindo a inspeção pré voo que verifique uma discrepância, qualquer componente faltante, com mau funcionamento ou inoperante no FSTD, deverá incluir ou fazer com que seja incluída a descrição desta discrepância no registro de discrepâncias.

60.21 Qualificação provisória de FSTDs de novos tipos ou modelos de aeronaves

(a) Um operador pode solicitar e a ANAC pode emitir uma qualificação provisória para um FSTD que simule um novo tipo ou modelo de aeronave, mesmo que o pacote de dados do fabricante da aeronave seja preliminar, mediante a aceitação dos seguintes documentos:

(1) os dados do fabricante da aeronave, que podem ser estimados, validados por um pacote limitado de dados de ensaio em voo;

(2) a descrição do fabricante da aeronave da metodologia de predição utilizada para desenvolver os dados; e

(3) os resultados do QTG.

(b) An FSTD that has been issued interim qualification is deemed to have been issued initial qualification, unless the ANAC rescinds the qualification. Interim qualification expires two years after the issuance of Statement of Qualification of this FSTD, unless the ANAC determines that specific conditions warrant otherwise.

(c) Within 12 months of the release of the final aircraft data package by the aircraft manufacturer, but no later than two years after the issuance of the interim Statement of Qualification, the sponsor must apply for initial qualification in accordance with section 60.15 of this regulation, based on the final aircraft data package approved by the aircraft manufacturer, unless the ANAC determines that specific conditions warrant otherwise.

(d) An FSTD with interim qualification may be modified only in accordance with section 60.23 of this regulation.

60.23 Modifications to FSTDs

(a). For the purposes of this regulation, an FSTD is said to have been modified when:

(1) equipment or devices intended to simulate aircraft appliances are added to or removed from FSTD, which change the Statement of Qualification or the MQTG; or

(2) changes are made to either software or hardware that are intended to impact flight or ground dynamics; changes are made that impact performance or handling characteristics of the FSTD (including motion, visual, control loading, or sound systems for those FSTD levels requiring sound tests and measurements); or changes are made to the MQTG. Changes to the MQTG which do not affect required objective testing results or validation data approved during the initial evaluation of the FSTD are not considered modifications under this section.

(b) Uma qualificação interina de FTSD é considerada uma qualificação inicial, a menos que a ANAC revogue a qualificação. A qualificação provisória de um FSTD termina dois anos após a emissão do Certificado de Qualificação deste FSTD, a menos que a ANAC determine que condições excepcionais devam ser aplicadas.

(c) Dentro de 12 meses após a disponibilização pelo fabricante do pacote final de dados da aeronave, mas não após 2 anos da emissão do Certificado de Qualificação interina, o requerente deverá solicitar uma avaliação para qualificação inicial de acordo com a seção 60.15 deste regulamento, baseada no pacote final de dados da aeronave, aprovado pelo fabricante da aeronave, a menos que a ANAC determine que condições excepcionais devam ser aplicadas.

(d) Um FSTD com uma qualificação provisória só pode ser modificado conforme a seção 60.23 deste regulamento.

60.23 Modificações a FSTDs

(a) Para os propósitos deste regulamento, um FSTD é considerado como tendo sido modificado quando:

(1) forem adicionados ou removidos equipamentos ou dispositivos que simulem as características da aeronave, resultando em uma alteração no Certificado de Qualificação ou no MQTG; ou

(2) forem realizadas alterações no *hardware* ou *software* do FSTD, com a intenção de impactar a simulação da dinâmica de solo ou de voo; forem realizadas alterações com a intenção de impactar o desempenho e a qualidade de voo do FSTD (incluindo o *control loading* e os sistemas de movimento, visual ou som); ou forem realizadas alterações no MQTG. Alterações no MQTG que não afetarem os resultados dos testes objetivos requeridos ou os dados de validação aprovados na avaliação para qualificação

(b) FSTD directive. When the ANAC determines that FSTD modification is necessary for safety of flight reasons, the sponsor of each affected FSTD must ensure that the FSTD is modified according to the FSTD directive.

(c) Using the modified FSTD. The sponsor may only use an FSTD with the proposed modification if:

(1) the sponsor has notified ANAC of their intent to incorporate the proposed modification, and one of the following has occurred;

(i) the ANAC responded the modification was approved; or

(ii) the sponsor has successfully completed any evaluation the ANAC designated as necessary before the modified FSTD is implemented; and

(2) the notification is submitted with the content as and in a form and a manner as specified in the applicable QMS.

(d) When a modification is made to an FSTD that affects the Statement of Qualification, as described in 60.23(a), the sponsor must add an addendum to the Statement of Qualification until an updated Statement is issued.

(e) MQTG update. Each time an FSTD is modified and an objective test or other MQTG section is affected by the modification, the MQTG must be updated with current objective test results in accordance with the paragraphs 60.15(h) and (i) of this regulation, and with appropriate objective data in accordance with the section 60.13 of this regulation. If an FSTD directive is the cause of this update, this directive to make the modification and the record of the modification completion must be kept in the MQTG.

inicial do FSTD não são consideradas modificações para os propósitos dessa seção.

(b) Diretriz de FSTD. Quando a ANAC, por meio de uma diretriz, determinar a necessidade de uma modificação no FSTD, para assegurar a segurança das operações, o operador de cada FSTD afetado deve garantir o comprimento desta.

(c) Utilização de um FSTD modificado. O operador só pode utilizar um FSTD com a modificação proposta se:

(1) o operador tiver notificado à ANAC a intenção de incorporar a modificação proposta, e pelo menos um dos seguintes eventos tenha ocorrido:

(i) a ANAC respondeu que a modificação foi aprovada; ou

(ii) o operador realizou com sucesso qualquer avaliação que a ANAC determinou ser necessária, antes que ele seja recolocado em operação com a modificação proposta; e

(2) a notificação for submetida à ANAC com seu conteúdo e forma conforme especificado no QMS aplicável.

(d) Quando uma modificação for realizada em um FSTD e esta afetar o Certificado de Qualificação, conforme a parágrafo 60.23(a) deste regulamento, o operador deve anexar o adendo ao Certificado até que seja emitido um Certificado de Qualificação atualizado.

(e) Atualização do MQTG. Cada vez que um FSTD for modificado e esta modificação afetar um teste objetivo ou outra seção do MQTG, o MQTG deve ser atualizado de acordo com os resultados dos testes objetivos descritos nos parágrafos 60.15(h) e (i) deste regulamento, fundamentados em dados objetivos conforme a seção 60.13 deste regulamento. Se uma diretriz da ANAC for a causa da atualização, esta diretriz para realizar a modificação e os registros da conclusão da modificação devem ser arquivados no MQTG.

60.25 Operation with missing, malfunctioning, or inoperative components

(a) No person may knowingly use an FSTD for any maneuver, procedure, or task that is to be accomplished when there is a missing, malfunctioning, or inoperative (MMI) component that is required to be present and correctly operate for the satisfactory completion of that task.

(b) Each MMI component, as described in paragraph (a) of this section, or any MMI component installed and required to operate correctly to meet the current Statement of Qualification, must be repaired or replaced within 30 calendar days, unless otherwise authorized by ANAC.

(c) A list of the current MMI components must be readily available in or adjacent to the FSTD for review by users of the device. Electronic access to this list via an appropriate terminal or display in or adjacent to the FSTD is satisfactory. The discrepancy log may be used to satisfy this requirement provided each currently MMI component is listed in the discrepancy log.

60.27 Automatic suspension of qualification and procedures for restoration of qualification

(a) An FSTD qualification is automatically suspended when any of the following occurs:

(1) the FSTD is not used in any ANAC-approved flight training program within the last 12 months in accordance with the paragraphs 60.7(b)(2) or (c)(1) of this regulation and the sponsor does not obtain and maintain a written statement as described in the paragraph 60.7(c)(2) of this regulation;

60.25 Operação do FSTD com componentes faltantes, com mau funcionamento ou inoperantes

(a) Nenhuma pessoa pode, intencionalmente, utilizar um FSTD para executar qualquer manobra, procedimento ou tarefa quando houver componente faltante, com mau funcionamento ou inoperante (*missing, malfunctioning, or inoperative - MMI*), caso este componente seja requerido para executar satisfatoriamente aquela manobra, procedimento ou tarefa.

(b) Todo componente MMI, conforme descrito no parágrafo (a) desta seção, requerido para atender ao funcionamento correto do FSTD, conforme o Certificado de Qualificação em vigor, deve ser reparado ou substituído dentro de 30 dias, exceto quando autorizado de maneira diferente pela ANAC.

(c) Uma lista dos componentes MMI deve estar disponível no FSTD ou em local adjacente para ser consultada pelos usuários. Acesso eletrônico para esta lista por meio de um terminal ou monitor localizado no FSTD ou em local adjacente é aceitável. O registro de discrepâncias pode ser utilizado para cumprir este requisito, desde que cada componente MMI no momento esteja listado no registro de discrepâncias.

60.27 Suspensão automática da qualificação e procedimentos para restauração da qualificação

(a) A qualificação de um FSTD é automaticamente suspensa quando qualquer uma das situações a seguir ocorrer:

(1) o FSTD não for utilizado, nos últimos 12 meses, em um programa de treinamento aprovado pela ANAC de acordo com os parágrafos 60.7 (b)(2) ou (c)(1) deste regulamento e o operador não obtiver nem mantiver uma declaração escrita em conformidade com o parágrafo 60.7(c)(2) deste regulamento;

(2) the FSTD is not inspected in accordance with the section 60.19 of this regulation;

(3) the FSTD is physically moved from one location and installed in a different location, regardless of distance;

(4) the MQTG is missing or otherwise not available and a replacement is not made within 30 days; or

(5) if the FSTD were out of service for a prolonged period. The ANAC will the evaluation criteria for an FSTD that has been removed from active status based on the number of continuing qualification evaluations and inspections established in paragraph 60.19(a) missed during the period of inactivity.

(b) If the FSTD qualification is suspended under paragraph (a) of this section, suspension may be revoked if either of the following provisions is met:

(1) the FSTD must successfully pass an evaluation as determined by ANAC; or

(2) the ANAC advises the sponsor that an evaluation is not necessary.

(c) In determining the criteria for the evaluation mentioned in paragraph (b)(1) of this section, the ANAC considers factors such as the number of continuing qualification evaluations missed, the number of sponsor-conducted quarterly inspections missed, the care that had been taken of the device since the last evaluation, among others.

60.29 Suspension and revocation of qualification by ANAC

(a) The ANAC may suspend, partially or totally, an operator or a FSTD qualification when it is found that:

(1) the FSTD's qualification standards are no longer met;

(2) o FSTD não for inspecionado, avaliado e mantido conforme a seção 60.19 deste regulamento;

(3) o FSTD for fisicamente movido de uma localização e instalado em uma localização diferente, independentemente da distância;

(4) o MQTG estiver por qualquer motivo indisponível e um sobressalente não for confeccionado em 30 dias; or

(5) o FSTD for inativado por período prolongado. A ANAC determinará o critério de retorno a serviço do FSTD baseada no número de avaliações contínuas de qualificação e inspeções progressivas de acordo com o parágrafo 60.19(a) deste regulamento perdidas durante o período de inatividade.

(b) Em caso de suspensão da qualificação do FSTD conforme o parágrafo (a) desta seção, a suspensão poderá ser revogada desde que uma das seguintes condições seja atendida:

(1) o FSTD deve ser aprovado em uma avaliação como determinado pela ANAC; ou

(2) a ANAC comunicar ao operador que uma avaliação não é necessária.

(c) Ao determinar os critérios para a avaliação mencionada no parágrafo (b)(1) desta seção, a ANAC considera fatores tais como a quantidade de avaliações recorrentes perdidas, a quantidade de inspeções não conduzidas pelo operador, o cuidado tomado com o FSTD desde a sua última avaliação, dentre outros.

60.29 Suspensão e revogação da qualificação pela ANAC

(a) A ANAC pode suspender parcialmente ou totalmente a qualificação de um FSTD quando for constatado que:

(1) o FSTD deixou de atender aos padrões de qualificação;

(2) the operator simulated the compliance of any of the requirements and minimum qualification standards or provided incomplete, inaccurate or false information with the purpose of obtaining a FSTD Statement of Qualification; or

(3) the operator is not able to demonstrate that the QMS is implemented and operating, or being implemented, in accordance with the section 60.5 of this regulation.

(b) The ANAC may revoke a FSTD's or an operator's Statement of Qualification when the operator or the FSTD is suspended and it is found that the operator does not have interest or capacity to regularize the situation.

(c) If the qualification of a FSTD is suspended in accordance with paragraph (a) of this section, the suspension may be revoked in accordance to the criteria described in paragraph 60.27(b) of this regulation.

(d) In determining the criteria for the evaluation referred to in paragraph 60.27(b)(1) of this regulation for the revocation of the suspension, ANAC considers factors such as the reason to suspend the qualification, any repairs or replacements that may have been completed, the number of continuing qualification evaluations missed, the number of sponsor-conducted quarterly inspections missed, and the care that had been taken of the device since the loss of qualification, among others.

60.31 Record keeping and reporting

(a) The FSTD sponsor must maintain the following records for each FSTD operated:

(1) the MQTG and each amendment thereto;

(2) a record of all FSTD modifications affected by the section 60.23 of this regulation since the issuance of the original Statement of Qualification;

(2) o operador simulou o cumprimento de qualquer dos requisitos e padrões mínimos de qualificação ou forneceu informações incompletas, inexatas ou falsas com a finalidade de obter um Certificado de Qualificação de FSTD; ou

(3) o operador não consegue demonstrar que o QMS esteja implantado e operando, ou em processo de implantação de acordo com a seção 60.5 deste regulamento.

(b) A ANAC pode revogar um Certificado de Qualificação de FSTD quando o operador ou o FSTD tiver sido suspenso e for constatado que o operador não tem interesse ou capacidade para regularizar a situação.

(c) Se a qualificação de um FSTD for suspensa conforme o parágrafo (a) desta seção, a suspensão poderá ser revogada de acordo com os critérios expostos no parágrafo 60.27(b) deste regulamento.

(d) Ao determinar os critérios para a avaliação mencionada no parágrafo 60.27(b)(1) deste regulamento para a revogação da suspensão, a ANAC considera fatores tais como o motivo da suspensão da qualificação, os reparos que possam ter sido necessários, a quantidade de avaliações recorrentes perdidas, a quantidade de inspeções não conduzidas pelo operador e o cuidado tomado com o FSTD desde a suspensão da qualificação, dentre outros.

60.31 Registros e documentação

(a) O operador de FSTD deve manter os seguintes registros para cada FSTD que opere:

(1) o MQTG com todas as suas revisões e emendas;

(2) um registro de todas as modificações de FSTD afetadas pela seção 60.23 deste regulamento desde a emissão do primeiro Certificado de Qualificação;

(3) a copy of all of the following:

(i) results of the qualification evaluations (initial and each upgrade) since the issuance of the original Statement of Qualification;

(ii) results of the objective tests conducted in accordance with the section 60.19(a) of this regulation for a period of 2 years;

(iii) results of the previous three continuing qualification evaluations, or the continuing qualification evaluations from the previous 2 years, whichever covers a longer period; and

(iv) reports obtained in accordance with the paragraph 60.9(b) of this regulation for a period of at least 90 days; and

(4) a record of all discrepancies entered in the discrepancy log over the previous 2 years, including the following:

(i) a list of the components or equipment that were or are MMI;

(ii) the action taken to correct the discrepancy;

(iii) the date that the corrective action was taken; and

(iv) the identity of the person that determined that the discrepancy has been corrected.

(b) The records specified in this section must be maintained in plain language form or in coded form if the coded form is able to preserve and retrieve the information in a manner acceptable to the ANAC.

60.33 [Reserved]

60.35 [Reserved]

(3) uma cópia de cada um dos seguintes registros:

(i) resultados das avaliações de qualificação (inicial e cada elevação de nível) desde a emissão do primeiro Certificado de Qualificação;

(ii) resultados dos testes objetivos conduzidos de acordo com o parágrafo 60.19(a) deste regulamento por um período de 2 anos;

(iii) resultados das três últimas avaliações de qualificação recorrente, ou das avaliações recorrentes que ocorreram nos 2 últimos anos, a qual cobrir um período de tempo maior; e

(iv) relatos obtidos de acordo com o parágrafo 60.9(b) deste regulamento por um período de pelo menos 90 dias; e

(4) um registro de todas as discrepâncias inseridas no registro de discrepâncias nos 2 últimos anos, incluindo:

(i) uma lista dos componentes ou equipamentos que estiveram ou estão MMI;

(ii) a ação corretiva tomada para sanar a discrepância;

(iii) a data na qual a ação corretiva foi tomada; e

(iv) a identificação da pessoa que determinou que a discrepância foi sanada.

(b) Os registros especificados nesta seção devem ser mantidos escritos em língua portuguesa ou inglesa, ou de forma codificada, se a forma de codificação for capaz de preservar e recuperar a informação de forma aceitável pela ANAC.

60.33 [Reservado]

60.35 [Reservado]

60.37 FSTD qualification based on the evaluation conducted by an ICAO contracting State

(a) Validation. The evaluation and qualification of an FSTD by a contracting State to the Convention on International Civil Aviation may be used as the basis for issuing a Brazilian Statement of Qualification by the ANAC to the sponsor of that FSTD, provided the FSTD qualification performance standards and surveillance of that State are consistent with this regulation, in accordance with criteria defined in Supplementary Instructions.

(b) An FSTD sponsored by a foreign civil aviation training center certified by a contracting State to the Convention on International Civil Aviation will be recognized as validated by ANAC if:

(1) the FSTD qualification is valid with the foreign civil aviation authority;

(2) the foreign civil aviation training center certificate is validated by ANAC in accordance with RBAC 142;

(3) the FSTD qualification performance standards and surveillance of that State are consistent with this regulation.

(c) The ANAC may evaluate and establish restrictions to an FSTD qualified by an ICAO contracting State.

60.37 Qualificação de FSTD baseada em avaliação realizada por um país signatário da ICAO

(a) Validação. A avaliação e qualificação de um FSTD realizada por um país signatário da Convenção de Aviação Civil Internacional poderá ser utilizada como base para a emissão de um Certificado de Qualificação brasileiro pela ANAC, para o operador daquele FSTD, se os padrões de desempenho para qualificação e vigilância de FSTD daquele país forem consistentes com os deste RBAC conforme critérios a serem estabelecidos em Instrução Suplementar.

(b) Um FSTD operado por Centro de Treinamento da Aviação Civil (CTAC) certificado por um país signatário da Convenção de Aviação Civil Internacional será considerado validado pela ANAC se:

(1) A qualificação do FSTD estiver válida junto à Autoridade de Aviação Civil estrangeira;

(2) O certificado do CTAC estrangeiro estiver validado pela ANAC em conformidade com RBAC nº 142; e

(3) Os padrões de desempenho para qualificação e vigilância de FSTD daquele país forem consistentes com os deste RBAC.

(c) A ANAC poderá avaliar e estabelecer restrições a um FSTD qualificado por um país signatário da ICAO.

APÊNDICE A (APPENDIX A)

QUALIFICATION PERFORMANCE STANDARDS FOR AIRPLANE FULL FLIGHT SIMULATORS

(a) In order to be qualified at a particular qualification level, the FFS must meet the standards listed in tables A1, A2, A3 and A4 of this appendix, available only in english.

(b) Each FFS must have a QTG, acceptable to the ANAC, that includes:

(1) Objective data obtained from traditional aircraft testing or another approved source;

(2) The results of FFS objective tests;

(3) The results of FFS subjective tests;
and

(4) A description of the equipment necessary to perform the evaluation for initial qualification and the continuing qualification evaluations.

REQUISITOS DE DESEMPENHO PARA QUALIFICAÇÃO DE SIMULADOR DE VOO (FFS) DE AVIÃO

(a) Para ser qualificado a um determinado nível, o FFS deve cumprir os requisitos listados nas tabelas A1, A2, A3 e A4 deste apêndice, disponíveis apenas em língua inglesa.

(b) Cada FFS deve possuir um QTG, aceito pela ANAC, contendo:

(1) Dados objetivos obtidos de ensaio em voo da aeronave ou outra fonte de dados aprovada;

(2) Os resultados dos testes objetivos do FFS;

(3) Os resultados dos testes subjetivos do FFS; e

(4) Uma descrição do equipamento necessário para executar as avaliações para qualificação inicial e para qualificação recorrente.

**Table A1 - General technical requirements for level A, B, C and D full-flight simulators -
 Airplane**

Qualification Level	General technical requirements
A	<p>The lowest level of FFS technical complexity. An enclosed full-scale replica of the airplane cockpit/flight deck including simulation of all systems, instruments, navigational equipment, communications, and caution and warning systems. An instructor's station with seat should be provided. Seats for the flight crew members and two seats for inspectors/observers should also be provided. Control forces and displacement characteristics should correspond to those of the replicated airplane and they should respond in the same manner as the airplane under the same flight conditions. The use of class-specific data tailored to the specific airplane type with fidelity sufficient to meet the objective tests, functions and subjective tests is allowed. Generic ground effect and ground handling models are permitted. Motion, visual and sound systems sufficient to support the training, testing and checking credits sought are required. The visual system should provide at least 45 degrees horizontal and 30 degrees vertical field of view per pilot. The response to control inputs should not be greater than 300 ms more than that experienced on the airplane. See table A2 for more simulator requirements.</p>
B	<p>As for level A, plus: Validation flight test data should be used as the basis for flight and performance and systems' characteristics. Additionally, ground handling and aerodynamics programming to include ground effect reaction and handling characteristics should be derived from validation flight test data. See table A2 for more simulator requirements.</p>
C	<p>The second highest level of FFS fidelity. As for level B, plus: A daylight/twilight/night visual system is required with a continuous, cross-cockpit, minimum collimated visual field of view providing each pilot with 176 degrees horizontal and 36 degrees vertical field of view. A six-degrees-of-freedom motion system should be provided. The sound simulation should include the sounds of precipitation and other significant airplane noises perceptible to the pilot and should be able to reproduce the sounds of a crash landing. The response to control inputs (motion and instrument cues) should not be greater than 100 ms more than that experienced on the airplane. For a visual system cues should not be greater than 120 ms more than that experienced on the airplane. Wind shear simulation should be provided. An upset prevention and recovery training (UPRT) instructor operating station (IOS) feedback mechanism should be available. See table A2 for more simulator requirements.</p>
D	<p>The highest level of FFS fidelity. As for level C, plus: Extended set of sound and motion buffet tests. Improved aerodynamic modeling. See table A2 for more simulator requirements.</p>

Table A2 - General Simulator Requirements

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
1.	General Flight Deck Configuration.	See below	NA
1.a.	<p>The simulator must have a flight deck that is a replica of the airplane simulated with controls, equipment, observable flight deck indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the airplane. The direction of movement of controls and switches must be identical to the airplane. Pilot seats must allow the occupant to achieve the design “eye position” established for the airplane being simulated. Equipment for the operation of the flight deck windows must be included, but the actual windows need not be operable. Additional equipment such as fire axes, extinguishers, and spare light bulbs must be available in the FFS but may be relocated to a suitable location as near as practical to the original position. Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette.</p> <p>The use of electronically displayed images with physical overlay or masking for simulator instruments and/or instrument panels is acceptable provided:</p> <ol style="list-style-type: none"> (1) All instruments and instrument panel layouts are dimensionally correct with differences, if any, being imperceptible to the pilot; (2) Instruments replicate those of the airplane including full instrument functionality and embedded logic; (3) Instruments displayed are free of quantization (stepping); (4) Instrument display characteristics replicate those of the airplane including: resolution, colors, luminance, brightness, fonts, fill patterns, line styles and symbology; (5) Overlay or masking, including bezels and bugs, as applicable, replicates the airplane panel(s); (6) Instrument controls and switches replicate and operate with the same technique, effort, travel and in the same direction as those in the airplane; 	A,B,C,D	For simulator purposes, the flight deck consists of all that space forward of a cross section of the flight deck at the most extreme aft setting of the pilots' seats, including additional required crewmember duty stations and those required bulkheads aft of the pilot seats. For clarification, bulkheads containing only items such as landing gear pin storage compartments, fire axes and extinguishers, spare light bulbs, and aircraft document pouches are not considered essential and may be omitted.

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	<p>(7) Instrument lighting replicates that of the airplane and is operated from the FSTD control for that lighting and, if applicable, is at a level commensurate with other lighting operated by that same control; and</p> <p>(8) As applicable, instruments must have faceplates that replicate those in the airplane; and</p>		
1.a.	<p>(1) The display image of any three dimensional instrument, such as an electro-mechanical instrument, should appear to have the same three dimensional depth as the replicated instrument. The appearance of the simulated instrument, when viewed from the principle operator’s angle, should replicate that of the actual airplane instrument. Any instrument reading inaccuracy due to viewing angle and parallax present in the actual airplane instrument should be duplicated in the simulated instrument display image.</p> <p>Viewing angle error and parallax must be minimized on shared instruments such and engine displays and standby indicators.</p>	C,D	NA
1.b.	Those circuit breakers that affect procedures or result in observable flight deck indications must be properly located and functionally accurate.	A,B,C,D	NA
2.	Programming.	See below	NA
2.a.	<p>A flight dynamics model that accounts for various combinations of drag and thrust normally encountered in flight must correspond to actual flight conditions, including the effect of change in airplane attitude, thrust, drag, altitude, temperature, gross weight, moments of inertia, center of gravity location, and configuration.</p> <p>An SOC is required.</p>	A,B,C,D	The SOC should include a range of tabulated target values to enable a demonstration of the mass properties model to be conducted from the instructor's station. The data at a minimum should contain 3 weight conditions including zero fuel weight and maximum taxi weight with a least 2 different combinations of zero fuel weight, fuel weight and payload for each

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
			condition.
2.a.	For Level C and Level D simulators, the effects of pitch attitude and of fuel slosh on the aircraft center of gravity must be simulated.	C,D	NA
2.b.	The simulator must have the computer capacity, accuracy, resolution, and dynamic response needed to meet the qualification level sought. An SOC is required.	A,B,C,D	NA
2.c.	Surface operations must be represented to the extent that allows turns within the confines of the runway and adequate controls on the landing and roll-out from a crosswind approach to a landing.	A	NA
2.d.	Ground handling and aerodynamic programming must include the following:	See below	NA
2.d.1.	Ground effect.	B,C,D	Ground effect includes modeling that accounts for roundout, flare, touchdown, lift, drag, pitching moment, trim, and power while in ground effect.
2.d.2.	Ground reaction. Ground reaction modeling must produce the appropriate effects during bounced or skipped landings, including the effects and indications of ground contact due to landing in an abnormal aircraft attitude (e.g. tailstrike or nosewheel contact). An SOC is required.	B,C,D	Ground reaction includes modeling that accounts for strut deflections, tire friction, and side forces. This is the reaction of the airplane upon contact with the runway during landing, and may differ with changes in factors such as gross weight, airspeed, or rate of descent on touchdown.
2.d.3.	Ground handling characteristics, including aerodynamic and ground reaction modeling including steering inputs, operations with crosswind, braking, thrust	B,C,D	In developing gust models for use in training, the FSTD sponsor

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	reversing, deceleration, and turning radius. An SOC is required describing source data used to construct gusting crosswind profiles.		should coordinate with the data provider to ensure that the gust models do not exceed the capabilities of the aerodynamic and ground models.
2.d.3.	Aerodynamic and ground reaction modeling to support training in crosswinds and gusting crosswinds up to the aircraft’s maximum demonstrated crosswind component. Realistic gusting crosswind profiles must be available to the instructors that have been tuned in intensity and variation to require pilot intervention to avoid runway departure during takeoff or landing roll. An SOC is required describing source data used to construct gusting crosswind profiles.	C,D	In developing gust models for use in training, the FSTD sponsor should coordinate with the data provider to ensure that the gust models do not exceed the capabilities of the aerodynamic and ground models.
2.e.	If the aircraft being simulated is one of the aircraft listed in section 121.358 of RBAC 121, Low- altitude windshear system equipment requirements, the simulator must employ windshear models that provide training for recognition of windshear phenomena and the execution of recovery procedures. Models must be available to the instructor/evaluator for the following critical phases of flight: <ul style="list-style-type: none"> (1) Prior to takeoff rotation; (2) At liftoff; (3) During initial climb; and (4) On final approach, below 500 ft AGL. Only those simulators meeting these requirements may be used to satisfy the training requirements of RBAC 121 pertaining to a certificate holder’s approved low-altitude windshear flight training program. The addition of realistic levels of turbulence associated with each required windshear profile must be available and selectable to the instructor. In addition to the four basic windshear models required for qualification, at least	C,D	If desired, Level A and B simulators may qualify for windshear training by meeting these standards. Windshear models may consist of independent variable winds in multiple simultaneous components. The simulator should employ a method to ensure the required survivable and non-survivable windshear scenarios are repeatable in the training environment.

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	two additional “complex” windshear models must be available to the instructor which represent the complexity of actual windshear encounters. These models must be available in the takeoff and landing configurations and must consist of independent variable winds in multiple simultaneous components.		
2.f.	The simulator must provide for manual and automatic testing of simulator hardware and software programming to determine compliance with simulator objective tests. An SOC is required.	C,D	Automatic “flagging” of out-of-tolerance situations is encouraged.
2.g.	Relative responses of the motion system, visual system, and flight deck instruments, measured by latency tests or transport delay tests. Motion onset should occur before the start of the visual scene change (the start of the scan of the first video field containing different information) but must occur before the end of the scan of that video field. Instrument response may not occur prior to motion onset. Test results must be within the following limits:	See below	The intent is to verify that the simulator provides instrument, motion, and visual cues that are, within the stated time delays, like the airplane responses. For airplane response, acceleration in the appropriate, corresponding rotational axis is preferred.
2.g.1.	300 milliseconds of the airplane response.	A,B	NA
2.g.2.	100 milliseconds of the airplane response (motion and instrument cues) 120 milliseconds of the airplane response (visual system cues)	C,D	NA
2.h.	The simulator must accurately reproduce the following runway conditions: (1) Dry; (2) Wet; (3) Icy; (4) Patchy Wet; (5) Patchy Icy; and	C,D	NA

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	<p>(6) Wet on Rubber Residue in Touchdown Zone; An SOC is required.</p>		
2.i.	<p>The simulator must simulate:</p> <ul style="list-style-type: none"> (1) brake and tire failure dynamics, including antiskid failure; and (2) decreased brake efficiency due to high brake temperatures, if applicable. <p>An SOC is required</p>	C,D	<p>Simulator pitch, side loading, and directional control characteristics should be representative of the airplane.</p>
2.j.	<p>Engine and Airframe Icing</p> <p>Modeling that includes the effects of icing, where appropriate, on the airframe, aerodynamics, and the engine(s). Icing models must simulate the aerodynamic degradation effects of ice accretion on the airplane lifting surfaces including loss of lift, decrease in stall angle of attack, change in pitching moment, decrease in control effectiveness, and changes in control forces in addition to any overall increase in drag. Aircraft systems (such as the stall protection system and autoflight system) must respond properly to ice accretion consistent with the simulated aircraft.</p> <p>Aircraft OEM data or other acceptable analytical methods must be utilized to develop ice accretion models. Acceptable analytical methods may include wind tunnel analysis and/or engineering analysis of the aerodynamic effects of icing on the lifting surfaces coupled with tuning and supplemental subjective assessment by a subject matter expert pilot.</p> <p>SOC and tests required.</p>	C,D	<p>SOC should be provided describing the effects which provide training in the specific skills required for recognition of icing phenomena and execution of recovery. The SOC should describe the source data and any analytical methods used to develop ice accretion models including verification that these effects have been tested.</p> <p>Icing effects simulation models are only required for those airplanes authorized for operations in icing conditions.</p>
2.k.	<p>The aerodynamic modeling in the simulator must include:</p> <ul style="list-style-type: none"> (1) Low-altitude level-flight ground effect; (2) Mach effect at high altitude; (3) Normal and reverse dynamic thrust effect on control surfaces; 	D	

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	<p>(4) Aeroelastic representations; and</p> <p>(5) Nonlinearities due to sideslip.</p> <p>An SOC is required and must include references to computations of aeroelastic representations and of nonlinearities due to sideslip.</p>		
2.l.	<p>The simulator must have aerodynamic and ground reaction modeling for the effects of reverse thrust on directional control, if applicable.</p> <p>An SOC is required.</p>	B,C,D	NA
2.m.	<p>High Angle of Attack Modeling</p> <p>Aerodynamic stall modeling that includes degradation in static/dynamic lateral-directional stability, degradation in control response (pitch, roll, and yaw), uncommanded roll response or roll-off requiring significant control deflection to counter, apparent randomness or non-repeatability, changes in pitch stability, Mach effects, and stall buffet, as appropriate to the aircraft type.</p> <p>The aerodynamic model must incorporate an angle of attack and sideslip range to support the training tasks. At a minimum, the model must support an angle of attack range to ten degrees beyond the stall identification angle of attack. The stall identification angle of attack is defined as the point where the behavior of the airplane gives the pilot a clear and distinctive indication through the inherent flight characteristics or the characteristics resulting from the operation of a stall identification device (e.g., a stick pusher) that the airplane has stalled.</p> <p>The model must be capable of capturing the variations seen in the stall characteristics of the airplane (e.g., the presence or absence of a pitch break, deterrent buffet, or other indications of a stall where present on the aircraft). The aerodynamic modeling must support stall training maneuvers in the following flight conditions:</p> <p>(1) Stall entry at wings level (1g);</p>	C,D	<p>The requirements in this section only apply to those FSTDs that are qualified for full stall training tasks.</p> <p>Sponsors may elect to not qualify an FSTD for full stall training tasks; however, the FSTD's qualification will be restricted to approach to stall training tasks that terminate at the activation of the stall warning system.</p> <p>Specific guidance should be available to the instructor which clearly communicates the flight configurations and stall maneuvers that have been evaluated in the FSTD for use in training.</p>

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	<p>(2) Stall entry in turning flight of at least 25° bank angle (accelerated stall);</p> <p>(3) Stall entry in a power-on condition (required only for propeller driven aircraft); and</p> <p>(4) Aircraft configurations of second segment climb, high altitude cruise (near performance limited condition), and approach or landing.</p> <p>A Statement of Compliance (SOC) is required which describes the aerodynamic modeling methods, validation, and checkout of the stall characteristics of the FSTD. The SOC must also include verification that the FSTD has been evaluated by a subject matter expert pilot acceptable to the ANAC.</p> <p>Where known limitations exist in the aerodynamic model for particular stall maneuvers (such as aircraft configurations and stall entry methods), these limitations must be declared in the required SOC.</p> <p>FSTDs qualified for full stall training tasks must also meet the instructor operating station (IOS) requirements for upset prevention and recovery training (UPRT) tasks as described in section 2.n. of this table.</p>		
2.n.	<p>Upset Prevention and Recovery Training (UPRT).</p> <p>Aerodynamics Evaluation: The simulator must be evaluated for specific upset recovery maneuvers for the purpose of determining that the combination of angle of attack and sideslip does not exceed the range of flight test validated data or wind tunnel/analytical data while performing the recovery maneuver. The following minimum set of required upset recovery maneuvers must be evaluated in this manner and made available to the instructor/evaluator. Other upset recovery scenarios as developed by the FSTD sponsor must be evaluated in the same manner:</p> <ul style="list-style-type: none"> (1) A nose-high, wings level aircraft upset; (2) A nose-low aircraft upset; and (3) A high bank angle aircraft upset. 	C,D	<p>This section generally applies to the qualification of airplane upset recovery training maneuvers or unusual attitude</p> <p>training maneuvers that exceed one or more of the following conditions:</p> <ul style="list-style-type: none"> Pitch attitude greater than 25 degrees, nose up Pitch attitude greater than 10 degrees, nose down

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	<p>Upset Scenarios: IOS selectable dynamic airplane upsets must provide guidance to the instructor concerning the method used to drive the FSTD into an upset condition, including any malfunction or degradation in the FSTD’s functionality required to initiate the upset. The unrealistic degradation of simulator functionality (such as degrading flight control effectiveness) to drive an airplane upset is generally not acceptable unless used purely as a tool for repositioning the FSTD with the pilot out of the loop.</p> <p>Instructor Operating System (IOS): The simulator must have a feedback mechanism in place to notify the instructor/evaluator when the simulator’s validated aerodynamic envelope and aircraft operating limits have been exceeded during an upset recovery training task. This feedback mechanism must include:</p> <ul style="list-style-type: none"> (1) FSTD validation envelope. This must be in the form of an alpha/beta envelope (or equivalent method) depicting the “confidence level” of the aerodynamic model depending on the degree of flight validation or source of predictive methods The envelopes must provide the instructor real-time feedback on the simulation during a maneuver. There must be a minimum of a (2) flaps up and flaps down envelope available; (3) Flight control inputs. This must enable the instructor to assess the pilot’s flight control displacements and forces (including fly-by- wire as appropriate); and (4) Airplane operational limits. This must display the aircraft operating limits during the maneuver as applicable for the configuration of the airplane. <p>Statement of Compliance (SOC): An SOC is required that defines the source data used to construct the FSTD validation envelope. The SOC must also verify that each upset prevention and recovery feature programmed at the instructor station and the associated training maneuver has been evaluated by a suitably qualified pilot using methods described in this section. The statement must confirm that the recovery maneuver can be performed such that the FSTD does not exceed the FSTD validation envelope, or when exceeded, that it is within the realm of confidence in</p>		<p>Bank angle greater than 45 degrees</p> <p>Flight at airspeeds inappropriate for conditions.</p> <p>FSTDs used to conduct upset recovery maneuvers at angles of attack above the stall warning system activation must meet the requirements for high angle of attack modeling as described in section 2.m.</p> <p>Special consideration should be given to the motion system response during upset prevention and recovery maneuvers. Notwithstanding the limitations of simulator motion, specific emphasis should be placed on tuning out motion system responses.</p> <p>Consideration should be taken with flight envelope protected airplanes as artificially positioning the airplane to a specified attitude may incorrectly initialize flight control laws.</p>

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	the simulation accuracy.		
3.	Equipment Operation.	See below	NA
3.a.	All relevant instrument indications involved in the simulation of the airplane must automatically respond to control movement or external disturbances to the simulated airplane; e.g., turbulence or windshear. Numerical values must be presented in the appropriate units. For Level C and Level D simulators, instrument indications must also respond to effects resulting from icing.	A,B,C,D	NA
3.b.	Communications, navigation, caution, and warning equipment must be installed and operate within the tolerances applicable for the airplane. Instructor control of internal and external navigational aids. Navigation aids must be usable within range or line-of-sight without restriction, as applicable to the geographic area.	A,B,C,D	
3.b.1.	Complete navigation database for at least 3 airports with corresponding precision and non-precision approach procedures, including navigational database updates.	C,D	NA
3.b.2.	Complete navigation database for at least 1 airport with corresponding precision and non-precision approach procedures, including navigational database updates.	A,B	NA
3.c.	Simulated airplane systems must operate as the airplane systems operate under normal, abnormal, and emergency operating conditions on the ground and in flight. Once activated, proper systems operation must result from system management by the crew member and not require any further input from the instructor's controls.	A,B,C,D	Airplane system operation should be predicated on, and traceable to, the system data supplied by the airplane manufacturer, original equipment manufacturer or alternative approved data for the airplane system or component. At a minimum, alternate approved data should validate the operation of all normal, abnormal, and

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
			emergency operating procedures and training tasks the FSTD is qualified to conduct.
3.d.	<p>The simulator must provide pilot controls with control forces and control travel that correspond to the simulated airplane. The simulator must also react in the same manner as in the airplane under the same flight conditions.</p> <p>Control systems must replicate airplane operation for the normal and any non-normal modes including back-up systems and should reflect failures of associated systems.</p> <p>Appropriate cockpit indications and messages must be replicated.</p>	A,B,C,D	NA
3.e.	<p>Simulator control feel dynamics must replicate the airplane. This must be determined by comparing a recording of the control feel dynamics of the simulator to airplane measurements. For initial and upgrade qualification evaluations, the control dynamic characteristics must be measured and recorded directly from the flight deck controls, and must be accomplished in takeoff, cruise, and landing flight conditions and configurations.</p>	C,D	NA
3.f.	<p>For aircraft equipped with a stick pusher system, control forces, displacement, and surface position must correspond to that of the airplane being simulated.</p> <p>A Statement of Compliance (SOC) is required verifying that the stick pusher system has been modeled, programmed, and validated using the aircraft manufacturer's design data or other acceptable data source. The SOC must address, at a minimum, stick pusher activation and cancellation logic as well as system dynamics, control displacement and forces as a result of the stick pusher activation.</p> <p>Tests required.</p>	C,D	The requirements in this section only apply to those FSTDs that are qualified for full stall training tasks.
4.	Instructor or Evaluator Facilities.	See below	NA

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
4.a.	In addition to the flight crewmember stations, the simulator must have at least two suitable seats for the instructor/check airman and ANAC inspector. These seats must provide adequate vision to the pilot's panel and forward windows. All seats other than flight crew seats need not represent those found in the airplane, but must be adequately secured to the floor and equipped with similar positive restraint devices.	A,B,C,D	The ANAC will consider alternatives to this standard for additional seats based on unique flight deck configurations.
4.b.	The simulator must have controls that enable the instructor/evaluator to control all required system variables and insert all abnormal or emergency conditions into the simulated airplane systems as described in the sponsor's ANAC-approved training program; or as described in the relevant operating manual as appropriate.	A,B,C,D	NA
4.c.	The simulator must have instructor controls for all environmental effects expected to be available at the IOS; e.g., clouds, visibility, icing, precipitation, temperature, storm cells and microbursts, turbulence, and intermediate and high altitude wind speed and direction.	A,B,C,D	NA
4.d.	The simulator must provide the instructor or evaluator the ability to present ground and air hazards.	C,D	For example, another airplane crossing the active runway or converging airborne traffic.
5.	Motion System.	See below	NA
5.a.	The simulator must have motion (force) cues perceptible to the pilot that are representative of the motion in an airplane.	A,B,C,D	For example, touchdown cues should be a function of the rate of descent (RoD) of the simulated airplane.
5.b.	The simulator must have a motion (force cueing) system with a minimum of three degrees of freedom (at least pitch, roll, and heave). An SOC is required.	A,B	NA
5.c.	The simulator must have a motion (force cueing) system that produces cues at least equivalent to those of a six-degrees-of-freedom, synergistic platform motion system	C,D	NA

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	(i.e., pitch, roll, yaw, heave, sway, and surge). An SOC is required.		
5.d.	The simulator must provide for the recording of the motion system response time. An SOC is required.	A,B,C,D	NA
5.e.	The simulator must provide motion effects programming to include:	See below	NA
5.e.1.	<ul style="list-style-type: none"> (1) Thrust effect with brakes set; (2) Runway rumble, oleo deflections, effects of ground speed, uneven runway, centerline lights, and taxiway characteristics; (3) Buffets on the ground due to spoiler/speedbrake extension and thrust reversal; (4) Bumps associated with the landing gear; (5) Buffet during extension and retraction of landing gear; (6) Buffet in the air due to flap and spoiler/speedbrake extension; (7) Approach-to-stall buffet and stall buffet (where applicable); (8) Representative touchdown cues for main and nose gear; (9) Nosewheel scuffing, if applicable; (10) Mach and maneuver buffet; (11) Engine failures, malfunctions, and engine damage (12) Tail and pod strike; 	B,C,D	If there are known flight conditions where buffet is the first indication of the stall, or where no stall buffet occurs, this characteristic should be included in the model.
5.e.2.	<ul style="list-style-type: none"> (13) Taxiing effects such as lateral and directional cues resulting from steering and braking inputs; (14) Buffet due to atmospheric disturbances (e.g. buffets due to turbulence, 	C,D	NA

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	gusting winds, storm cells, windshear, etc.) in three linear axes (isotropic); (15) Tire failure dynamics; and (16) Other significant vibrations, buffets and bumps that are not mentioned above (e.g. RAT), or checklist items such as motion effects due to pre-flight flight control inputs.		
5.f.	The simulator must provide characteristic motion vibrations that result from operation of the airplane if the vibration marks an event or airplane state that can be sensed in the flight deck.	D	The simulator should be programmed and instrumented in such a manner that the characteristic buffet modes can be measured and compared to airplane data.
6.	Visual System.	See below	NA
6.a.	The simulator must have a visual system providing an out-of-the-flight deck view.	A,B,C,D	NA
6.b.	The simulator must provide a continuous collimated field-of-view of at least 45° horizontally and 30° vertically per pilot seat or the number of degrees necessary to meet the visual ground segment requirement, whichever is greater. Both pilot seat visual systems must be operable simultaneously. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage. An SOC is required and must explain the system geometry measurements including system linearity and field-of-view.	A,B	Additional field-of-view capability may be added at the sponsor's discretion provided the minimum fields of view are retained.
6.c.	(Reserved)	NA	NA
6.d.	The simulator must provide a continuous collimated visual field-of-view of at least 176° horizontally and 36° vertically or the number of degrees necessary to meet the visual ground segment requirement, whichever is greater. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum	C,D	The horizontal field-of-view is traditionally described as a 180° field-of-view. However, the field-of-view is technically no less than

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	<p>continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage.</p> <p>An SOC is required and must explain the system geometry measurements including system linearity and field-of-view.</p>		176°. Additional field-of-view capability may be added at the sponsor's discretion provided the minimum fields of view are retained.
6.e.	The visual system must be free from optical discontinuities and artifacts that create non-realistic cues.	A,B,C,D	Non-realistic cues might include image "swimming" and image "roll-off," that may lead a pilot to make incorrect assessments of speed, acceleration, or situational awareness.
6.f.	The simulator must have operational landing lights for night scenes. Where used, dusk (or twilight) scenes require operational landing lights.	A,B,C,D	NA
6.g.	<p>The simulator must have instructor controls for the following:</p> <ul style="list-style-type: none"> (1) Visibility in statute miles (km) and runway visual range (RVR) in ft.(m); (2) Airport selection; and (3) Airport lighting. 	A,B,C,D	NA
6.h.	The simulator must provide visual system compatibility with dynamic response programming.	A,B,C,D	NA
6.i.	The simulator must show that the segment of the ground visible from the simulator flight deck is the same as from the airplane flight deck (within established tolerances) when at the correct airspeed, in the landing configuration, at the appropriate height above the touchdown zone, and with appropriate visibility.	A,B,C,D	This will show the modeling accuracy of RVR, glideslope, and localizer for a given weight, configuration, and speed within the airplane's operational envelope for a normal approach and landing.
6.j.	The simulator must provide visual cues necessary to assess sink rates (provide depth	B,C,D	NA

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	perception) during takeoffs and landings, to include: (1) Surface on runways, taxiways, and ramps; and (2) Terrain features.		
6.k.	The simulator must provide for accurate portrayal of the visual environment relating to the simulator attitude.	A,B,C,D	Visual attitude vs. simulator attitude is a comparison of pitch and roll of the horizon as displayed in the visual scene compared to the display on the attitude indicator.
6.l.	The simulator must provide for quick confirmation of visual system color, RVR, focus, and intensity. An SOC is required.	C,D	NA
6.m.	The simulator must be capable of producing at least 10 levels of occulting.	C,D	NA
6.n.	Night Visual Scenes. When used in training, testing, or checking activities, the simulator must provide night visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Scenes must include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by airplane landing lights.	A,B,C,D	NA
6.o.	Dusk (or Twilight) Visual Scenes. When used in training, testing, or checking activities, the simulator must provide dusk (or twilight) visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Dusk (or twilight) scenes, as a minimum, must provide full color presentations of reduced ambient intensity, sufficient surfaces with appropriate textural cues that include self-illuminated objects such as road networks, ramp lighting and airport signage, to conduct a visual approach, landing and airport movement (taxi). Scenes must include a definable horizon and typical terrain	C,D	NA

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	<p>characteristics such as fields, roads and bodies of water and surfaces illuminated by airplane landing lights. If provided, directional horizon lighting must have correct orientation and be consistent with surface shading effects. Total night or dusk (twilight) scene content must be comparable in detail to that produced by 10,000 visible textured surfaces and 15,000 visible lights with sufficient system capacity to display 16 simultaneously moving objects.</p> <p>An SOC is required.</p>		
<p>6.p.</p>	<p>Daylight Visual Scenes. The simulator must provide daylight visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Any ambient lighting must not “washout” the displayed visual scene. Total daylight scene content must be comparable in detail to that produced by 10,000 visible textured surfaces and 6,000 visible lights with sufficient system capacity to display 16 simultaneously moving objects. The visual display must be free of apparent and distracting quantization and other distracting visual effects while the simulator is in motion.</p> <p>An SOC is required.</p>	<p>C,D</p>	<p>NA</p>
<p>6.q.</p>	<p>The simulator must provide operational visual scenes that portray physical relationships known to cause landing illusions to pilots.</p>	<p>C,D</p>	<p>For example: short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path, unique topographic features.</p>
<p>6.r.</p>	<p>The simulator must provide special weather representations of light, medium, and heavy precipitation near a thunderstorm on takeoff and during approach and landing. Representations need only be presented at and below an altitude of 2,000 ft. (610 m) above the airport surface and within 10 miles (16 km) of the airport.</p>	<p>C,D</p>	<p>NA</p>
<p>6.s.</p>	<p>The simulator must present visual scenes of wet and snow-covered runways, including runway lighting reflections for wet conditions, partially obscured lights for</p>	<p>C,D</p>	<p>NA</p>

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	snow conditions, or suitable alternative effects.		
6.t.	The simulator must present realistic color and directionality of all airport lighting.	C,D	NA
6.u.	<p>The following weather effects as observed on the visual system must be simulated and respective instructor controls provided.</p> <ul style="list-style-type: none"> (1) Multiple cloud layers with adjustable bases, tops, sky coverage and scud effect; (2) Storm cells activation and/or deactivation; (3) Visibility and runway visual range (RVR), including fog and patchy fog effect; (4) Effects on ownship external lighting; (5) Effects on airport lighting (including variable intensity and fog effects); (6) Surface contaminants (including wind blowing effect); (7) Variable precipitation effects (rain, hail, snow); (8) In-cloud airspeed effect; and (9) Gradual visibility changes entering and breaking out of cloud. 	C,D	<p>Scud effects are low, detached, and irregular clouds below a defined cloud layer.</p> <p>Atmospheric model should support representative effects of wake turbulence and mountain waves as needed to enhance UPRT training.</p> <p>The mountain wave model should support the atmospheric climb, descent, and roll rates which can be encountered in mountain wave and rotor conditions.</p>
6.v.	<p>The simulator must provide visual effects for:</p> <ul style="list-style-type: none"> (1) Light poles; (2) Raised edge lights as appropriate; and (3) Glow associated with approach lights in low visibility before physical lights are seen, 	C,D	<p>Visual effects for light poles and raised edge lights are for the purpose of providing additional depth perception during takeoff, landing, and taxi training tasks. Three dimensional modeling of the actual poles and stanchions is not required.</p>
6.w	A minimum of one (1) representative airport model required for simulator qualification. The fidelity of the airport model must be sufficient for the aircrew to	A,B	The model identifications must be acceptable to the ANAC, selectable

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	visually identify the airport; determine the position of the simulated airplane within a night visual scene; successfully accomplish take-offs, approaches, and landings; and maneuver around the airport on the ground as necessary.		from the IOS, and listed on the SOQ.
6.x	A minimum of three (3) real-world airport models required for simulator qualification. Must be consistent with published data used for airplane operations. Each model should be in a different visual scene to permit assessment of FSTD automatic visual scene changes.	C,D	The model identifications must be acceptable to the ANAC, selectable from the IOS, and listed on the SOQ.
7.	Sound System.	See below	NA
7.a.	The simulator must provide flight deck sounds that result from pilot actions that correspond to those that occur in the airplane.	A,B,C,D	NA
7.b.	The volume control must have an indication of sound level setting which meets all qualification requirements.	A,B,C,D	For Level D simulators, this indication should be readily available to the instructor on or about the IOS and is the sound level setting required to meet the objective testing requirements. For all other simulator levels, this indication is the sound level setting as evaluated during the simulator's initial evaluation.
7.c.	The simulator must accurately simulate the sound of precipitation, windshield wipers, and other significant airplane noises perceptible to the pilot during normal and abnormal operations, and include the sound of a crash (when the simulator is landed in an unusual attitude or in excess of the structural gear limitations); normal engine and thrust reversal sounds; and the sounds of flap, gear, and spoiler extension and retraction. Sounds must be directionally representative.	C,D	For simulators qualified for full stall training tasks, sounds associated with stall buffet should be replicated if significant in the airplane.

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	A SOC is required.		
7.d.	The simulator must provide realistic amplitude and frequency of flight deck noises and sounds. Simulator performance must be recorded, compared to amplitude and frequency of the same sounds recorded in the airplane, and be made a part of the QTG.	D	NA

Table A3 - Table of Tasks vs. Simulator Level – Subjective Requirements

In order to be qualified at the simulator qualification level indicated, the simulator must be able to perform at least the tasks associated with that level of qualification.

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
1.	Preflight Procedures.	See below	
1.a.	Preflight Inspection (flight deck only)	A,B,C,D	
1.b.	Engine Start	A,B,C,D	
1.c.	Taxiing	B(R),C,D	
1.d.	Pre-takeoff Checks	A,B,C,D	
2.	Takeoff and Departure Phase.	See below	
2.a.	Normal and Crosswind Takeoff	B(R),C,D	
2.b.	Instrument Takeoff	A,B,C,D	
2.c.	Engine Failure During Takeoff	A(a),B,C,D	
2.d.	Rejected Takeoff	A,B,C,D	
2.e.	Departure Procedure	A,B,C,D	
3.	Inflight Maneuvers.	See below	
3.a.	Steep Turns	A,B,C,D	
3.b.	High Angle of Attack Maneuvers	See below	
3.b.1	Approaches to Stall	A,B,C,D	
3.b.2	Full Stall	C,D	Stall maneuvers at angles of attack above the activation of the stall warning system.

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
			Required only for FSTDs qualified to conduct full stall training tasks as indicated on the Statement of Qualification.
3.c.	Engine Failure—Multiengine Airplane	A,B,C,D	
3.d.	Engine Failure—Single-Engine Airplane	A,B,C,D	
3.e.	Specific Flight Characteristics incorporated into the user's ANAC approved flight training program.	A(a),B(a),C(a),D(a)	
3.f.	Recovery From Unusual Attitudes	A,B,C,D	Within the normal flight envelope supported by applicable simulation validation data.
3.g.	Upset Prevention and Recovery Training (UPRT)	C,D	Upset recovery or unusual attitude training maneuvers within the FSTD's validation envelope that are intended to exceed pitch attitudes greater than 25 degrees nose up; pitch attitudes greater than 10 degrees nose down, and bank angles greater than 45 degrees.
4.	Instrument Procedures.	See below	
4.a.	Standard Terminal Arrival / Flight Management System Arrivals Procedures	A,B,C,D	

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
4.b.	Holding	A,B,C,D	
4.c.	Precision Instrument	See below	
4.c.1.	All engines operating.	A,B,C,D	e.g., Autopilot, Manual (Flt. Dir. Assisted), Manual (Raw Data)
4.c.2.	One engine inoperative.	A,B,C,D	e.g., Manual (Flt. Dir. Assisted), Manual (Raw Data)
4.d.	Non-precision Instrument Approach	A,B,C,D	e.g., NDB, VOR, VOR/DME, VOR/TAC, RNAV, LOC, LOC/BC, ADF, and SDF.
4.e.	Circling Approach	A,B,C,D	Specific authorization required.
4.f.	Missed Approach	See below	
4.f.1.	Normal.	A,B,C,D	
4.f.2.	One engine Inoperative.	A,B,C,D	
5.	Landings and Approaches to Landings.	See below	
5.a.	Normal and Crosswind Approaches and Landings	B(R),C,D	
5.b.	Landing From a Precision / Non-Precision Approach	B(R),C,D	
5.c.	Approach and Landing with (Simulated) Engine Failure – Multiengine Airplane	B(R),C,D	
5.d.	Landing From Circling Approach	B(R),C,D	
5.e.	Rejected Landing	A,B,C,D	

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
5.f.	Landing From a No Flap or a Nonstandard Flap Configuration Approach	B(R),C,D	
6.	Normal and Abnormal Procedures.	See below	
6.a.	Engine (including shutdown and restart)	A,B,C,D	
6.b.	Fuel System	A,B,C,D	
6.c.	Electrical System	A,B,C,D	
6.d.	Hydraulic System	A,B,C,D	
6.e.	Environmental and Pressurization Systems	A,B,C,D	
6.f.	Fire Detection and Extinguisher Systems	A,B,C,D	
6.g.	Navigation and Avionics Systems	A,B,C,D	
6.h.	Automatic Flight Control System, Electronic Flight Instrument System, and Related Subsystems	A,B,C,D	
6.i.	Flight Control Systems	A,B,C,D	
6.j.	Anti-ice and Deice Systems	A,B,C,D	
6.k.	Aircraft and Personal Emergency Equipment	A,B,C,D	
7.	Emergency Procedures.	See below	
7.a.	Emergency Descent (Max. Rate)	A,B,C,D	
7.b.	Inflight Fire and Smoke Removal	A,B,C,D	
7.c.	Rapid Decompression	A,B,C,D	
7.d.	Emergency Evacuation	A,B,C,D	

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
8.	Postflight Procedures.	See below	
8.a.	After-Landing Procedures	A,B,C,D	
8.b.	Parking and Securing	A,B,C,D	

“(a)”—indicates that the system, task, or procedure may be examined if the appropriate aircraft system or control is simulated in the FSTD and is working properly.

“(R)”—indicates that the simulator may be qualified for this task for continuing qualification training. “A,B,C,D”—indicates that the simulator must be able to perform this task for this level of qualification

Table A4 - Table of Simulator System Tasks – Subjective Requirements

In order to be qualified at the simulator qualification level indicated, the simulator must be able to perform at least the tasks associated with that level of qualification.

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
1.	Instructor Operating Station (IOS), as appropriate.	See below	NA
1.a.	Power switch(es).	A,B,C,D	NA
1.b.	Airplane conditions.	A,B,C,D	e.g., GW, CG, Fuel loading and Systems.
1.c.	Airports / Runways.	A,B,C,D	e.g., Selection, Surface, Presets, Lighting controls.
1.d.	Environmental controls.	A,B,C,D	e.g., Clouds, Visibility, RVR, Temp, Wind, Ice, Snow, Rain, and Windshear.
1.e.	Airplane system malfunctions (Insertion / deletion)	A,B,C,D	NA
1.f.	Locks, Freezes, and Repositioning.	A,B,C,D	NA
2.	Sound Controls.	See below	NA
2.a.	On / off / adjustment	A,B,C,D	NA
3.	Motion / Control Loading System.	See below	NA
3.a.	On / off / emergency stop.	A,B,C,D	NA
4.	Observer Seats / Stations.	See below	NA
4.a.	Position / Adjustment / Positive restraint system.	A,B,C,D	NA

APÊNDICE B (APPENDIX B)

QUALIFICATION PERFORMANCE STANDARDS FOR AIRPLANE FLIGHT TRAINING DEVICES

(a) In order to be qualified at a particular qualification level, the FTD must meet the standards listed in tables B1, B2, B3 and B4 of this appendix, available only in English.

(b) Except for level 4 FTD, each FTD must have a QTG, acceptable to the ANAC, that includes:

(1) Objective data obtained from traditional aircraft testing or another approved source;

(2) The results of FTD objective tests;

(3) The results of FTD subjective tests;
and

(4) A description of the equipment necessary to perform the evaluation for initial qualification and the continuing qualification evaluations.

REQUISITOS DE DESEMPENHO PARA QUALIFICAÇÃO DISPOSITIVO DE TREINAMENTO DE VOO (FTD) DE AVIÃO

(a) Para ser qualificado a um determinado nível, o FTD deve cumprir os requisitos listados nas tabelas B1, B2, B3 e B4 deste apêndice, disponíveis apenas em língua inglesa.

(b) Exceto para FTD nível 4, cada FTD deve possuir um QTG, aceito pela ANAC, contendo:

(1) Dados objetivos obtidos de ensaio em voo da aeronave ou outra fonte de dados aprovada;

(2) Os resultados dos testes objetivos do FTD;

(3) Os resultados dos testes subjetivos do FTD; e

(4) Uma descrição do equipamento necessário para executar as avaliações para qualificação inicial e para qualificação recorrente.

Table B1 – General technical requirements for FTD levels - Airplane

FTD Level	General technical requirements
4	<p>A device that may have an open airplane-specific flight deck area, or an enclosed airplane-specific flight deck and at least one operating system.</p> <p>Air/ground logic is required (no aerodynamic programming required). All displays may be flat/LCD panel representations or actual representations of displays in the aircraft.</p> <p>All controls, switches, and knobs may be touch sensitive activation (not capable of manual manipulation of the flight controls) or may physically replicate the aircraft in control operation.</p> <p>See table B2 for more FTD requirements.</p>
5	<p>A device that may have an open airplane-specific flight deck area, or an enclosed airplane-specific flight deck; generic aerodynamic programming; at least one operating system; and control loading that is representative of the simulated airplane only at an approach speed and configuration.</p> <p>All displays may be flat/LCD panel representations or actual representations of displays in the aircraft.</p> <p>Primary and secondary flight controls (e.g., rudder, aileron, elevator, flaps, spoilers/speed brakes, engine controls, landing gear, nosewheel steering, trim, brakes) must be physical controls.</p> <p>All other controls, switches, and knobs may be touch sensitive activation.</p> <p>See table B2 for more FTD requirements.</p>
6	<p>A device that has an enclosed airplane-specific flight deck; airplane-specific aerodynamic programming; all applicable airplane systems operating; control loading that is representative of the simulated airplane throughout its ground and flight envelope; and significant sound representation.</p> <p>All displays may be flat/LCD panel representations or actual representations of displays in the aircraft, but all controls, switches, and knobs must physically replicate the aircraft in control operation.</p> <p>See table B2 for more FTD requirements.</p>
7	<p>A Level 7 device is one that has an enclosed airplane-specific flight deck and aerodynamic program with all applicable airplane systems operating and control loading that is representative of the simulated airplane throughout its ground and flight envelope and significant sound representation.</p> <p>All displays may be flat/LCD panel representations or actual representations of displays in the aircraft, but all controls, switches, and knobs must physically replicate the aircraft in control operation.</p> <p>It also has a visual system that provides an out-of-the-flight deck view, providing cross-flight deck viewing (for both pilots simultaneously) of a field-of-view of at least 180° horizontally and 40° vertically.</p> <p>See table B2 for more FTD requirements.</p>

Table B2 – General FTD Requirements

Entry Number	General FTD Requirements	FTD Level	Notes/Information
1.	General Flight deck Configuration.	See next	NA
1.a.	<p>The FTD must have a flight deck that is a replica of the airplane simulated with controls, equipment, observable flight deck indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the airplane. The direction of movement of controls and switches must be identical to that in the airplane. Pilot seat(s) must afford the capability for the occupant to be able to achieve the design “eye position.” Equipment for the operation of the flight deck windows must be included, but the actual windows need not be operable. Fire axes, extinguishers, and spare light bulbs must be available in the flight FTD, but may be relocated to a suitable location as near as practical to the original position. Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette.</p> <p>The use of electronically displayed images with physical overlay or masking for FTD instruments and/or instrument panels is acceptable provided:</p> <ol style="list-style-type: none"> (1) All instruments and instrument panel layouts are dimensionally correct with differences, if any, being imperceptible to the pilot; (2) Instruments replicate those of the airplane including full instrument functionality and embedded logic; (3) Instruments displayed are free of quantization (stepping); (4) Instrument display characteristics replicate those of the airplane including: resolution, colors, luminance, brightness, fonts, fill patterns, line styles and symbology; (5) Overlay or masking, including bezels and bugs, as applicable, replicates the airplane panel(s); (6) Instrument controls and switches replicate and operate with the same technique, effort, travel and in the same direction as those in the 	6,7	<p>For FTD purposes, the flight deck consists of all that space forward of a cross section of the fuselage at the most extreme aft setting of the pilots' seats including additional, required flight crewmember duty stations and those required bulkheads aft of the pilot seats. For clarification, bulkheads containing only items such as landing gear pin storage compartments, fire axes and extinguishers, spare light bulbs, aircraft documents pouches are not considered essential and may be omitted.</p> <p>For Level 6 FTDs, flight deck window panes may be omitted where non-distracting and subjectively acceptable to conduct qualified training tasks.</p>

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	<p>airplane;</p> <p>(7) Instrument lighting replicates that of the airplane and is operated from the FSTD control for that lighting and, if applicable, is at a level commensurate with other lighting operated by that same control; and</p> <p>(8) As applicable, instruments must have faceplates that replicate those in the airplane; and</p> <p>Level 7 FTD only;</p> <p>The display image of any three dimensional instrument, such as an electro- mechanical instrument, should appear to have the same three dimensional depth as the replicated instrument. The appearance of the simulated instrument, when viewed from the principle operator’s angle, should replicate that of the actual airplane instrument. Any instrument reading inaccuracy due to viewing angle and parallax present in the actual airplane instrument should be duplicated in the simulated instrument display image. Viewing angle error and parallax must be minimized on shared instruments such as engine displays and standby indicators.</p>		
1.b.	<p>The FTD must have equipment (e.g., instruments, panels, systems, circuit breakers, and controls) simulated sufficiently for the authorized training/checking events to be accomplished. The installed equipment must be located in a spatially correct location and may be in a flight deck or an open flight deck area. Additional equipment required for the authorized training/checking events must be available in the FTD, but may be located in a suitable location as near as practical to the spatially correct position. Actuation of equipment must replicate the appropriate function in the airplane. Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette.</p>	4,5	None
1.c.	<p>Those circuit breakers that affect procedures or result in observable flight deck indications must be properly located and functionally accurate.</p>	7	None
2.	Programming.	See next	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
2.a.1	<p>The FTD must provide the proper effect of aerodynamic changes for the combinations of drag and thrust normally encountered in flight. This must include the effect of change in airplane attitude, thrust, drag, altitude, temperature, and configuration.</p> <p>Level 6 additionally requires the effects of changes in gross weight and center of gravity.</p> <p>Level 5 requires only generic aerodynamic programming. An SOC is required.</p>	5,6	None
2.a.2	<p>A flight dynamics model that accounts for various combinations of drag and thrust normally encountered in flight must correspond to actual flight conditions, including the effect of change in airplane attitude, thrust, drag, altitude, temperature, gross weight, moments of inertia, center of gravity location, and configuration.</p> <p>The effects of pitch attitude and of fuel slosh on the aircraft center of gravity must be simulated.</p> <p>An SOC is required.</p>	7	None
2.b.	<p>The FTD must have the computer capacity, accuracy, resolution, and dynamic response needed to meet the qualification level sought.</p> <p>An SOC is required.</p>	4,5,6,7	None
2.c.1	<p>Relative responses of the flight deck instruments must be measured by latency tests, or transport delay tests, and may not exceed 300 milliseconds. The instruments must respond to abrupt input at the pilot's position within the allotted time, but not before the time when the airplane responds under the same conditions.</p> <p>(1) Latency: The FTD instrument and, if applicable, the motion system and the visual system response must not be prior to that time when the airplane responds and may respond up to 300 milliseconds after that time under the same conditions.</p> <p>(2) Transport Delay: As an alternative to the Latency requirement, a transport delay objective test may be used to demonstrate that the FTD system does not</p>	5,6	<p>The intent is to verify that the FTD provides instrument cues that are, within the stated time delays, like the airplane responses. For airplane response, acceleration in the appropriate, corresponding rotational axis is preferred.</p>

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	<p>exceed the specified limit. The sponsor must measure all the delay encountered by a step signal migrating from the pilot's control through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the instrument display and, if applicable, the motion system, and the visual system.</p>		
<p>2.c.2.</p>	<p>Relative responses of the motion system, visual system, and flight deck instruments, measured by latency tests or transport delay tests. Motion onset should occur before the start of the visual scene change (the start of the scan of the first video field containing different information) but must occur before the end of the scan of that video field. Instrument response may not occur prior to motion onset. Test results must be within the following limits: 100 ms for the motion (if installed) and instrument systems; and 120 ms for the visual system.</p>	<p>7</p>	<p>The intent is to verify that the FTD provides instrument, motion, and visual cues that are, within the stated time delays, like the airplane responses. For airplane response, acceleration in the appropriate, corresponding rotational axis is preferred.</p>
<p>2.d.</p>	<p>Ground handling and aerodynamic programming must include the following:</p>	<p>See next</p>	<p>None</p>
<p>2.d.1.</p>	<p>Ground effect.</p>	<p>7</p>	<p>Ground effect includes modeling that accounts for roundout, flare, touchdown, lift, drag, pitching moment, trim, and power while in ground effect.</p>
<p>2.d.2.</p>	<p>Ground reaction.</p>	<p>7</p>	<p>Ground reaction includes modeling that accounts for strut deflections, tire friction, and side forces. This is the reaction of the airplane upon contact with the runway during landing, and may differ with changes in factors such as gross weight, airspeed, or rate of descent on touchdown.</p>

Entry Number	General FTD Requirements	FTD Level	Notes/Information
2.d.3.	Ground handling characteristics, including aerodynamic and ground reaction modeling including steering inputs, operations with crosswind, gusting crosswind, braking, thrust reversing, deceleration, and turning radius.	7	None
2.e.	<p>If the aircraft being simulated is one of the aircraft listed in section 121.358 of RBAC 121, Low- altitude windshear system equipment requirements, the FTD must employ windshear models that provide training for recognition of windshear phenomena and the execution of recovery procedures. Models must be available to the instructor/evaluator for the following critical phases of flight:</p> <ul style="list-style-type: none"> (1) Prior to takeoff rotation; (2) At liftoff; (3) During initial climb; and (4) On final approach, below 500 ft AGL. <p>The addition of realistic levels of turbulence associated with each required windshear profile must be available and selectable to the instructor.</p> <p>In addition to the four basic windshear models required for qualification, at least two additional “complex” windshear models must be available to the instructor which represent the complexity of actual windshear encounters. These models must be available in the takeoff and landing configurations and must consist of independent variable winds in multiple simultaneous components. The Windshear Training Aid provides two such example “complex” windshear models that may be used to satisfy this requirement.</p>	7	<p>Windshear models may consist of independent variable winds in multiple simultaneous components.</p> <p>The FTD should employ a method to ensure the required survivable and non-survivable windshear scenarios are repeatable in the training environment.</p> <p>For Level 7 FTDs, windshear training tasks may only be qualified for aircraft equipped with a synthetic stall warning system. The qualified windshear profile(s) are evaluated to ensure the synthetic stall warning (and not the stall buffet) is first indication of the stall.</p>
2.f.	<p>The FTD must provide for manual and automatic testing of FTD hardware and software programming to determine compliance with FTD objective tests.</p> <p>An SOC is required.</p>	7	Automatic “flagging” of out-of-tolerance situations is encouraged.
2.g.	The FTD must accurately reproduce the following runway conditions:	7	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	(1) Dry; (2) Wet; (3) Icy; (4) Patchy Wet; (5) Patchy Icy; and (6) Wet on Rubber Residue in Touchdown Zone. An SOC is required.		
2.h.	The FTD must simulate: (1) brake and tire failure dynamics, including antiskid failure; and (2) decreased brake efficiency due to high brake temperatures, if applicable. An SOC is required	7	FTD pitch, side loading, and directional control characteristics should be representative of the airplane.
2.i.	Engine and Airframe Icing Modeling that includes the effects of icing, where appropriate, on the airframe, aerodynamics, and the engine(s). Icing models must simulate the aerodynamic degradation effects of ice accretion on the airplane lifting surfaces including loss of lift, decrease in stall angle of attack, change in pitching moment, decrease in control effectiveness, and changes in control forces in addition to any overall increase in drag. Aircraft systems (such as the stall protection system and autoflight system) must respond properly to ice accretion consistent with the simulated aircraft. Aircraft OEM data or other acceptable analytical methods must be utilized to develop ice accretion models that are representative of the simulated aircraft's performance degradation in a typical in-flight icing encounter. Acceptable analytical methods may include wind tunnel analysis and/or engineering analysis of the aerodynamic effects of icing on the lifting surfaces coupled with tuning and supplemental subjective	7	SOC should be provided describing the effects which provide training in the specific skills required for recognition of icing phenomena and execution of recovery. The SOC should describe the source data and any analytical methods used to develop ice accretion models including verification that these effects have been tested. Icing effects simulation models are only required for those airplanes authorized for operations in icing conditions. Icing simulation models

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	assessment by a subject matter expert pilot. SOC required.		should be developed to provide training in the specific skills required for recognition of ice accumulation and execution of the required response.
2.j.	The aerodynamic modeling in the FTD must include: (1) Low-altitude level-flight ground effect; (2) Mach effect at high altitude; (3) Normal and reverse dynamic thrust effect on control surfaces; (4) Aeroelastic representations; and (5) Nonlinearities due to sideslip. An SOC is required and must include references to computations of aeroelastic representations and of nonlinearities due to sideslip.	7	NA
2.k.	The FTD must have aerodynamic and ground reaction modeling for the effects of reverse thrust on directional control, if applicable. An SOC is required.	7	None
3.	Equipment Operation.	See next	None
3.a.	All relevant instrument indications involved in the simulation of the airplane must automatically respond to control movement or external disturbances to the simulated airplane; e.g., turbulence or windshear. Numerical values must be presented in the appropriate units. For Level 7 FTDs, instrument indications must also respond to effects resulting from icing.	5,6,7	None
3.b.1.	Navigation equipment must be installed and operate within the tolerances applicable	5,6	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	<p>for the airplane.</p> <p>Levels 6 must also include communication equipment (inter-phone and air/ground) like that in the airplane and, if appropriate to the operation being conducted, an oxygen mask microphone system.</p> <p>Level 5 need have only that navigation equipment necessary to fly an instrument approach.</p>		
3.b.2.	<p>Communications, navigation, caution, and warning equipment must be installed and operate within the tolerances applicable for the airplane.</p> <p>Instructor control of internal and external navigational aids. Navigation aids must be usable within range or line-of-sight without restriction, as applicable to the geographic area.</p>	7	NA
3.b.3.	<p>Complete navigation database for at least 3 airports with corresponding precision and non-precision approach procedures, including navigational database updates.</p>	7	None
3.c.1.	<p>Installed systems must simulate the applicable airplane system operation, both on the ground and in flight. Installed systems must be operative to the extent that applicable normal, abnormal, and emergency operating procedures included in the sponsor's training programs can be accomplished.</p> <p>Level 6 must simulate all applicable airplane flight, navigation, and systems operation.</p> <p>Level 5 must have at least functional flight and navigational controls, displays, and instrumentation.</p> <p>Level 4 must have at least one airplane system installed and functional.</p>	4,5,6	None
3.c.2.	<p>Simulated airplane systems must operate as the airplane systems operate under normal, abnormal, and emergency operating conditions on the ground and in flight.</p> <p>Once activated, proper systems operation must result from system management by the crew member and not require any further input from the instructor's controls.</p>	7	Airplane system operation should be predicated on, and traceable to, the system data supplied by the airplane manufacturer, original equipment manufacturer or

Entry Number	General FTD Requirements	FTD Level	Notes/Information
			alternative approved data for the airplane system or component. At a minimum, alternate approved data should validate the operation of all normal, abnormal, and emergency operating procedures and training tasks the FSTD is qualified to conduct.
3.d.	The lighting environment for panels and instruments must be sufficient for the operation being conducted.	4,5,6,7	Back-lighted panels and instruments may be installed but are not required.
3.e.	The FTD must provide control forces and control travel that corresponds to the airplane being simulated. Control forces must react in the same manner as in the airplane under the same flight conditions. For Level 7 FTDs, control systems must replicate airplane operation for the normal and any non-normal modes including back-up systems and should reflect failures of associated systems. Appropriate cockpit indications and messages must be replicated.	6,7	None
3.f.	The FTD must provide control forces and control travel of sufficient precision to manually fly an instrument approach.	5	None
3.e.	FTD control feel dynamics must replicate the airplane. This must be determined by comparing a recording of the control feel dynamics of the FTD to airplane measurements. For initial and upgrade qualification evaluations, the control dynamic characteristics must be measured and recorded directly from the flight deck controls, and must be accomplished in takeoff, cruise, and landing flight conditions and configurations.	7	None
4.	Instructor or Evaluator Facilities.	See next	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
4.a.1.	In addition to the flight crewmember stations, suitable seating arrangements for an instructor/check airman and ANAC Inspector must be available. These seats must provide adequate view of crewmember's panel(s).	4,5,6	These seats need not be a replica of an aircraft seat and may be as simple as an office chair placed in an appropriate position.
4.a.2.	In addition to the flight crewmember stations, the FTD must have at least two suitable seats for the instructor/check airman and ANAC inspector. These seats must provide adequate vision to the pilot's panel and forward windows. All seats other than flight crew seats need not represent those found in the airplane, but must be adequately secured to the floor and equipped with similar positive restraint devices.	7	The ANAC will consider alternatives to this standard for additional seats based on unique flight deck configurations.
4.b.1.	The FTD must have instructor controls that permit activation of normal, abnormal, and emergency conditions as appropriate. Once activated, proper system operation must result from system management by the crew and not require input from the instructor controls.	4,5,6	None
4.b.2.	The FTD must have controls that enable the instructor/evaluator to control all required system variables and insert all abnormal or emergency conditions into the simulated airplane systems as described in the sponsor's ANAC-approved training program; or as described in the relevant operating manual as appropriate.	7	None
4.c.	The FTD must have instructor controls for all environmental effects expected to be available at the IOS; e.g., clouds, visibility, icing, precipitation, temperature, storm cells and microbursts, turbulence, and intermediate and high altitude wind speed and direction.	7	None
4.d.	The FTD must provide the instructor or evaluator the ability to present ground and air hazards.	7	For example, another airplane crossing the active runway or converging airborne traffic.
5.	Motion System.	See next	

Entry Number	General FTD Requirements	FTD Level	Notes/Information
5.a.	The FTD may have a motion system, if desired, although it is not required. If a motion system is installed and additional training, testing, or checking credits are being sought on the basis of having a motion system, the motion system operation may not be distracting and must be coupled closely to provide integrated sensory cues. The motion system must also respond to abrupt input at the pilot's position within the allotted time, but not before the time when the airplane responds under the same conditions.	5,6,7	The motion system standards set out in RBAC 60, Appendix A for at least Level A simulators is acceptable.
5.b.	If a motion system is installed, it must be measured by latency tests or transport delay tests and may not exceed 300 milliseconds. Instrument response may not occur prior to motion onset.	6,7	The motion system standards set out in RBAC 60, Appendix A for at least Level A simulators is acceptable.
6.	Visual System.	See next	None
6.a.	The FTD may have a visual system, if desired, although it is not required. If a visual system is installed, it must meet the following criteria:	4,5,6	None
6.a.1.	The visual system must respond to abrupt input at the pilot's position. An SOC is required.	5,6	None
6.a.2.	The visual system must be at least a single channel, non-collimated display. An SOC is required.	4,5,6	None
6.a.3.	The visual system must provide at least a field-of-view of 18° vertical / 24° horizontal for the pilot flying. An SOC is required.	4,5,6	None
6.a.4.	The visual system must provide for a maximum parallax of 10° per pilot. An SOC is required.	4,5,6	None
6.a.5.	The visual scene content may not be distracting.	4,5,6	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	An SOC is required.		
6.a.6.	The minimum distance from the pilot’s eye position to the surface of a direct view display may not be less than the distance to any front panel instrument. An SOC is required.		None
6.a.7.	The visual system must provide for a minimum resolution of 5 arc-minutes for both computed and displayed pixel size.	4,5,6	None
	An SOC is required.		
6.b.	If a visual system is installed and additional training, testing, or checking credits are being sought on the basis of having a visual system, a visual system meeting the standards set out for at least a Level A FFS (see Appendix A of this RBAC) will be required. A “direct-view,” non-collimated visual system (with the other requirements for a Level A visual system met) may be considered satisfactory for those installations where the visual system design “eye point” is appropriately adjusted for each pilot’s position such that the parallax error is at or less than 10° simultaneously for each pilot. An SOC is required.	6	Directly projected, non- collimated visual displays may prove to be unacceptable for dual pilot applications.
6.c.	The FTD must have a visual system providing an out-of-the-flight deck view.	7	None
6.d.	The FTD must provide a continuous visual field-of-view of at least 176° horizontally and 36° vertically or the number of degrees necessary to meet the visual ground segment requirement, whichever is greater. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage. An SOC is required and must explain the system geometry measurements including system linearity and field-of-view. Collimation is not required but parallax effects must be minimized (not greater than 10° for each pilot when aligned for the point midway between the left and right seat	7	The horizontal field-of-view is traditionally described as a 180° field-of-view. However, the field-of-view is technically no less than 176°. Additional field-of-view capability may be added at the sponsor’s discretion provided the minimum fields of view are retained.

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	eyepoints).		
6.e.	The visual system must be free from optical discontinuities and artifacts that create non-realistic cues.	7	Non-realistic cues might include image “swimming” and image “roll-off,” that may lead a pilot to make incorrect assessments of speed, acceleration, or situational awareness.
6.f.	The FTD must have operational landing lights for night scenes. Where used, dusk (or twilight) scenes require operational landing lights.	7	None
6.g.	The FTD must have instructor controls for the following: (1) Visibility in statute miles (km) and runway visual range (RVR) in ft.(m); (2) Airport selection; and (3) Airport lighting.	7	None
6.h.	The FTD must provide visual system compatibility with dynamic response programming.	7	None
6.i.	The FTD must show that the segment of the ground visible from the FTD flight deck is the same as from the airplane flight deck (within established tolerances) when at the correct airspeed, in the landing configuration, at the appropriate height above the touchdown zone, and with appropriate visibility.	7	This will show the modeling accuracy of RVR, glideslope, and localizer for a given weight, configuration, and speed within the airplane's operational envelope for a normal approach and landing.
6.j.	The FTD must provide visual cues necessary to assess sink rates (provide depth perception) during takeoffs and landings, to include: (1) Surface on runways, taxiways, and ramps; and (2) Terrain features.	7	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
6.k.	The FTD must provide for accurate portrayal of the visual environment relating to the FTD attitude.	7	Visual attitude vs. FTD attitude is a comparison of pitch and roll of the horizon as displayed in the visual scene compared to the display on the attitude indicator.
6.l.	The FTD must provide for quick confirmation of visual system color, RVR, focus, and intensity. An SOC is required.	7	None
6.m.	The FTD must be capable of producing at least 10 levels of occulting.	7	None
6.n.	Night Visual Scenes. When used in training, testing, or checking activities, the FTD must provide night visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Scenes must include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by airplane landing lights.	7	None
6.o.	Dusk (or Twilight) Visual Scenes. When used in training, testing, or checking activities, the FTD must provide dusk (or twilight) visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Dusk (or twilight) scenes, as a minimum, must provide full color presentations of reduced ambient intensity, sufficient surfaces with appropriate textural cues that include self-illuminated objects such as road networks, ramp lighting and airport signage, to conduct a visual approach, landing and airport movement (taxi). Scenes must include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by airplane landing lights. If provided, directional horizon lighting must have correct orientation and be consistent with surface shading effects. Total night or dusk (twilight) scene content must be comparable in detail to	7	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	<p>that produced by 10,000 visible textured surfaces and 15,000 visible lights with sufficient system capacity to display 16 simultaneously moving objects.</p> <p>An SOC is required.</p>		
6.p.	Daylight Visual Scenes. The FTD must provide daylight visual scenes with sufficient scene content to recognize the airport, the terrain, and major	7	None
	<p>landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Any ambient lighting must not “washout” the displayed visual scene. Total daylight scene content must be comparable in detail to that produced by 10,000 visible textured surfaces and 6,000 visible lights with sufficient system capacity to display 16 simultaneously moving objects. The visual display must be free of apparent and distracting quantization and other distracting visual effects while the FTD is in motion.</p> <p>An SOC is required.</p>		
6.q.	The FTD must provide operational visual scenes that portray physical relationships known to cause landing illusions to pilots.	7	For example: short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path, unique topographic features.
6.r.	The FTD must provide special weather representations of light, medium, and heavy precipitation near a thunderstorm on takeoff and during approach and landing. Representations need only be presented at and below an altitude of 2,000 ft. (610 m) above the airport surface and within 10 miles (16 km) of the airport.	7	None
6.s.	The FTD must present visual scenes of wet and snow-covered runways, including runway lighting reflections for wet conditions, partially obscured lights for snow conditions, or suitable alternative effects.	7	None
6.t.	The FTD must present realistic color and directionality of all airport lighting.	7	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
6.u.	The following weather effects as observed on the visual system must be simulated and respective instructor controls provided. <ul style="list-style-type: none"> (1) Multiple cloud layers with adjustable bases, tops, sky coverage and scud effect; (2) Storm cells activation and/or deactivation; (3) Visibility and runway visual range (RVR), including fog and patchy fog effect; (4) Effects on ownship external lighting; (5) Effects on airport lighting (including variable intensity and fog effects); (6) Surface contaminants (including wind blowing effect); (7) Variable precipitation effects (rain, hail, snow); (8) In-cloud airspeed effect; and (9) Gradual visibility changes entering and breaking out of cloud. 	7	Scud effects are low, detached, and irregular clouds below a defined cloud layer.
6.v.	The simulator must provide visual effects for: <ul style="list-style-type: none"> (1) Light poles; (2) Raised edge lights as appropriate; and (3) Glow associated with approach lights in low visibility before physical lights are seen. 	7	Visual effects for light poles and raised edge lights are for the purpose of providing additional depth perception during takeoff, landing, and taxi training tasks. Three dimensional modeling of the actual poles and stanchions is not required.
6.w	A minimum of three (3) real-world airport models required for simulator qualification. Must be consistent with published data used for airplane operations. Each model should be in a different visual scene to permit assessment of FSTD automatic visual scene changes.	7	The model identifications must be acceptable to the sponsor's TPAA, selectable from the IOS, and listed on the SOQ.
7.	Sound System.	See next	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
7.a.	The FTD must provide flight deck sounds that result from pilot actions that correspond to those that occur in the airplane.	6,7	None
7.b.	The volume control must have an indication of sound level setting which meets all qualification requirements.	7	This indication is of the sound level setting as evaluated during the FTD's initial evaluation.
7.c.	The FTD must accurately simulate the sound of precipitation, windshield wipers, and other significant airplane noises perceptible to the pilot during normal and abnormal operations, and include the sound of a crash (when the FTD is landed in an unusual attitude or in excess of the structural gear limitations); normal engine and thrust reversal sounds; and the sounds of flap, gear, and spoiler extension and retraction. Sounds must be directionally representative. An SOC is required.	7	None
7.d.	The FTD must provide realistic amplitude and frequency of flight deck noises and sounds. FTD performance must be recorded, subjectively assessed for the initial evaluation, and be made a part of the QTG.	7	None

Table B3 - Table of Tasks vs. FTD Level – Subjective Requirements

In order to be qualified at the FTD qualification level indicated, the FTD must be able to perform at least the tasks associated with that level of qualification. See Notes 1, 2 and 3 at the end of the Table.

Entry Number	Subjective Requirements	FTD Level	Notes/Information
1.	Preflight Procedures.	See next	None
1.a.	Preflight Inspection (flight deck only)	4(a),5(a),6,7	None
1.b.	Engine Start	4(a),5(a),6,7	None
1.c.	Taxiing	7(t)	None
1.d.	Pre-takeoff Checks	4(a),5(a),6,7	None
2.	Takeoff and Departure Phase.	See next	None
2.a.	Normal and Crosswind Takeoff	7(t)	None
2.b.	Instrument Takeoff	7(t)	None
2.c.	Engine Failure During Takeoff	7(t)	None
2.d.	Rejected Takeoff (requires visual system)	6(a),7	None
2.e.	Departure Procedure	5,6,7	None
3.	Inflight Maneuvers.	See next	None
3.a.	Steep Turns	5,6,7	None
3.b.	Approaches to Stalls	5(a),6,7	Approach to stall maneuvers qualified only where the aircraft does not exhibit stall buffet as the first indication of the stall.
3.c.	Engine Failure—Multiengine Airplane	5(a),6,7	None
3.d.	Engine Failure—Single-Engine Airplane	5(a),6,7	None

Entry Number	Subjective Requirements	FTD Level	Notes/Information
3.e.	Specific Flight Characteristics incorporated into the user's ANAC approved flight training program.	4(a),5(a),6(a),7(a)	Level 4 FTDs have no minimum requirement for aerodynamic programming and are generally not qualified to conduct in-flight maneuvers.
3.f.	Windshear Recovery	7(t)	For Level 7 FTD, windshear recovery may be qualified at the Sponsor's option. See Table B2 for specific requirements and limitations.
4.	Instrument Procedures.	See next	None
4.a.	Standard Terminal Arrival / Flight Management System Arrivals Procedures	5(a),6,7	None
4.b.	Holding	5(a),6,7	None
4.c.	Precision Instrument		None
4.c.1.	All engines operating.	5(a),6,7	e.g., Autopilot, Manual (Flt. Dir. Assisted), Manual (Raw Data)
4.c.2.	One engine inoperative.	7(t)	e.g., Manual (Flt. Dir. Assisted), Manual (Raw Data)
4.d.	Non-precision Instrument Approach	5(a),6,7	e.g., NDB, VOR, VOR/DME, VOR/TAC, RNAV, LOC, LOC/BC, ADF, and SDF.
4.e.	Circling Approach (requires visual system)	6(a),7	Specific authorization required.
4.f.	Missed Approach		None
4.f.1.	Normal.	5(a),6,7	None
4.f.2.	One engine Inoperative.	7(t)	None
5.	Landings and Approaches to Landings.	See next	None

Entry Number	Subjective Requirements	FTD Level	Notes/Information
5.a.	Normal and Crosswind Approaches and Landings	7(t)	None
5.b.	Landing From a Precision / Non-Precision Approach	7(t)	None
5.c.	Approach and Landing with (Simulated) Engine Failure – Multiengine Airplane	7(t)	None
5.d.	Landing From Circling Approach	7(t)	None
5.e.	Rejected Landing	7(t)	None
5.f.	Landing From a No Flap or a Nonstandard Flap Configuration Approach	7(t)	None
6.	Normal and Abnormal Procedures.	See next	None
6.a.	Engine (including shutdown and restart)	4(a),5(a),6,7	None
6.b.	Fuel System	4(a),5(a),6,7	None
6.c.	Electrical System	4(a),5(a),6,7	None
6.d.	Hydraulic System	4(a),5(a),6,7	None
6.e.	Environmental and Pressurization Systems	4(a),5(a),6,7	None
6.f.	Fire Detection and Extinguisher Systems	4(a),5(a),6,7	None
6.g.	Navigation and Avionics Systems	4(a),5(a),6,7	None
6.h.	Automatic Flight Control System, Electronic Flight Instrument System, and Related Subsystems	4(a),5(a),6,7	None
6.i.	Flight Control Systems	4(a),5(a),6,7	None
6.j.	Anti-ice and Deice Systems	4(a),5(a),6,7	None
6.k.	Aircraft and Personal Emergency Equipment	4(a),5(a),6,7	None
7.	Emergency Procedures.	See next	None
7.a.	Emergency Descent (Max. Rate)	5(a),6,7	None
7.b.	Inflight Fire and Smoke Removal	5(a),6,7	None
7.c.	Rapid Decompression	5(a),6,7	None

Entry Number	Subjective Requirements	FTD Level	Notes/Information
7.d.	Emergency Evacuation	4(a),5(a),6,7	None
8.	Postflight Procedures.	See next	None
8.a.	After-Landing Procedures	4(a),5(a),6,7	None
8.b.	Parking and Securing	4(a),5(a),6,7	None

Note 1: An “(a)” in the table indicates that the system, task, or procedure, although not required to be present, may be examined if the appropriate airplane system is simulated in the FTD and is working properly.

Note 2: Items not installed or not functional on the FTD and not appearing on the SOQ Configuration List, are not required to be listed as exceptions on the SOQ.

Note 3: A “(t)” in the table indicates that the task may only be qualified for introductory initial or recurrent qualification training. These tasks may not be qualified for proficiency testing or checking credits in an ANAC approved flight training program.

Table B4 - Table of FTD System Tasks – Subjective Requirements

In order to be qualified at the FTD qualification level indicated, the FTD must be able to perform at least the tasks associated with that level of qualification.

Entry Number	Subjective Requirements	FTD Level	Notes/Information
1.	Instructor Operating Station (IOS).	See next	NA
1.a.	Power switch(es).	4,5,6	NA
1.b.	Airplane conditions.	4(a),5,6	e.g., GW, CG, Fuel loading, Systems, Ground. Crew
1.c.	Airports / Runways.	4,5,6	e.g., Selection and Presets; Surface and Lighting controls if equipped with a visual system.
1.d.	Environmental controls.	4,5,6	e.g., Temp, Wind.
1.e.	Airplane system malfunctions (Insertion / deletion)	4(a),5,6	NA
1.f.	Locks, Freezes, and Repositioning.	4,5,6	NA
1.g.	Sound Controls. (On / off / adjustment)	4,5,6	NA
1.h.	Motion / Control Loading System, as appropriate. On / off / emergency stop	4(a),5(a),6(a)	NA
2.	Observer Seats / Stations.	See next	NA
2.a.	Position / Adjustment / Positive restraint system.	4,5,6	NA

Note 1: An “(a)” in the table indicates that the system, task, or procedure, although not required to be present, may be examined if the appropriate system is in the FTD and is working properly.

APÊNDICE C (APPENDIX C)

QUALIFICATION PERFORMANCE STANDARDS FOR HELICOPTER FULL FLIGHT SIMULATORS

(a) In order to be qualified at a particular qualification level, the FFS must meet the standards listed in tables C1, C2, C3 and C4 of this appendix, available only in english..

(b) Each FFS must have a QTG, acceptable to the ANAC, that includes:

(1) Objective data obtained from traditional aircraft testing or another approved source;

(2) The results of FFS objective tests;

(3) The results of FFS subjective tests;
and

(4) A description of the equipment necessary to perform the evaluation for initial qualification and the continuing qualification evaluations.

REQUISITOS DE DESEMPENHO PARA QUALIFICAÇÃO DE SIMULADOR DE VOO (FFS) DE HELICÓTERO

(a) Para ser qualificado a um determinado nível, o FFS deve cumprir os requisitos listados nas tabelas C1, C2, C3 e C4 deste apêndice, disponíveis apenas em língua inglesa.

(b) Cada FFS deve possuir um QTG, aceito pela ANAC, contendo:

(1) Dados objetivos obtidos de ensaio em voo da aeronave ou outra fonte de dados aprovada;

(2) Os resultados dos testes objetivos do FFS;

(3) Os resultados dos testes subjetivos do FFS; e

(4) Uma descrição do equipamento necessário para executar as avaliações para qualificação inicial e para qualificação recorrente.

Table C1 - General technical requirements for level B, C and D full-flight simulators - Helicopter

Qualification Level	General technical requirements
B	<p>The lowest level of FFS technical complexity for a helicopter.</p> <p>An enclosed full-scale replica of the helicopter cockpit with representative pilots' seats, including simulation of all systems, instruments, navigational equipment, communications and caution and warning systems.</p> <p>An instructor's station with seat should be provided and at least one additional seat for inspectors/observers.</p> <p>Static control forces and displacement characteristics should correspond to that of the replicated helicopter and they should reflect the helicopter under the same static flight conditions.</p> <p>Motion, visual and sound systems sufficient to support the training, testing and checking credits sought are required.</p> <p>The response to control inputs should not be greater than 150 ms more than that experienced on the helicopter.</p> <p>Validation flight test data should be used as the basis for flight and performance and systems characteristics.</p> <p>Additionally ground handling and aerodynamics programming to include ground effect reaction and handling characteristics should be derived from validation flight test data.</p> <p>A motion system having a minimum of three degrees of freedom (pitch, roll, and heave) to accomplish the required training tasks should be provided. A reduced six-axis motion performance envelope is acceptable.</p> <p>See table C2 for more simulator requirements.</p>
C	<p>The second highest level of simulator performance. As for level B plus: A daylight/dusk/night visual system is required with a continuous field of view per pilot of not less than 146° horizontal and 36° vertical.</p> <p>The sound simulation should include the sounds of precipitation and significant helicopter noises perceptible to the pilot and should be able to reproduce the sounds of a crash landing.</p> <p>The response to control inputs should not be greater than 100 ms more than that experienced on the helicopter.</p> <p>Turbulence and other atmospheric models should be provided to support the training, testing and checking credit sought.</p> <p>See table C2 for more simulator requirements.</p>
D	<p>The highest level of simulator performance.</p> <p>As for level C plus:</p> <p>A full daylight/dusk/night visual system is required with a continuous field of view per pilot of not less than 176° horizontal and 56° vertical and an extended set of sound and motion buffet tests.</p> <p>See table C2 for more simulator requirements.</p>

Table C2 - General Simulator Requirements

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
1.	General Flight Deck Configuration.	See next	None
1.a.	<p>The simulator must have a flight deck that is a replica of the helicopter being simulated. The simulator must have controls, equipment, observable flight deck indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the helicopter. The direction of movement of controls and switches must be identical to that in the helicopter. Pilot seats must afford the capability for the occupant to be able to achieve the design “eye position” established for the helicopter being simulated.</p> <p>Equipment for the operation of the flight deck windows must be included, but the actual windows need not be operable. Fire axes, extinguishers, and spare light bulbs must be available in the FFS but may be relocated to a suitable location as near as practical to the original position. Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette.</p>	B,C,D	For simulator purposes, the flight deck consists of all that space forward of a cross section of the fuselage at the most extreme aft setting of the pilots' seats including additional, required flight crewmember duty stations and those required bulkheads aft of the pilot seats. For clarification, bulkheads containing only items such as landing gear pin storage compartments, fire axes and extinguishers, spare light bulbs, and aircraft documents pouches are not considered essential and may be omitted.
1.b.	Those circuit breakers that affect procedures or result in observable flight deck indications must be properly located and functionally accurate.	B,C,D	None
2.	Programming.	See next	None
2.a.	<p>A flight dynamics model that accounts for various combinations of air speed and power normally encountered in flight must correspond to actual flight conditions, including the effect of change in helicopter attitude, aerodynamic and propulsive forces and moments, altitude, temperature, mass, center of gravity location, and configuration.</p> <p>An SOC is required.</p>	B,C,D	None

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
2.b.	The simulator must have the computer capacity, accuracy, resolution, and dynamic response needed to meet the qualification level sought. An SOC is required.	B,C,D	None
2.c.	Ground handling (where appropriate) and aerodynamic programming must include the following:	See next	None
2.c.1.	Ground effect. Level B does not require hover programming. An SOC is required.	B,C,D	Applicable areas include flare and touch down from a running landing as well as for in-ground-effect (IGE) hover. A reasonable simulation of ground effect includes modeling of lift, drag, pitching moment, trim, and power while in ground effect.
2.c.2.	Ground reaction. Level B does not require hover programming. An SOC is required.	B,C,D	Reaction of the helicopter upon contact with the landing surface during landing (e.g., strut deflection, tire or skid friction, side forces) may differ with changes in gross weight, airspeed, rate of descent on touchdown, and slide slip.
2.d.	The simulator must provide for manual and automatic testing of simulator hardware and software programming to determine compliance with simulator objective tests. An SOC is required.	C,D	This may include an automated system, which could be used for conducting at least a portion of the QTG tests. Automatic “flagging” of out-of-tolerance situations is encouraged.
2.e.	The relative responses of the motion system, visual system, and flight deck instruments	See next	The intent is to verify that the

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	must be measured by latency tests or transport delay tests. Motion onset must occur before the end of the scan of that video field. Instrument response may not occur prior to motion onset. Test results must be within the following limits:		simulator provides instrument, motion, and visual cues that are like the helicopter responses within the stated time delays. It is preferable motion onset occur before the start of the visual scene change (the start of the scan of the first video field containing different information). For helicopter response, acceleration in the appropriate corresponding rotational axis is preferred.
2.e.1.	Response must be within 150 milliseconds of the helicopter response.	B	None
2.e.2.	Response must be within 100 milliseconds of the helicopter response.	C,D	None
2.f.	The simulator must simulate brake and tire failure dynamics (including antiskid failure, if appropriate). An SOC is required.	C,D	The simulator should represent the motion (in the appropriate axes) and the directional control characteristics of the helicopter when experiencing simulated brake or tire failures.
2.g.	The aerodynamic modeling in the simulator must include: (1) Ground effect, (2) Effects of airframe and rotor icing (if applicable), (3) Aerodynamic interference effects between the rotor wake and fuselage, (4) Influence of the rotor on control and stabilization systems, (5) Representations of settling with power, and	C,D	NA

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	(6) Retreating blade stall. An SOC is required.		
2.h.	The simulator must provide for realistic mass properties, including gross weight, center of gravity, and moments of inertia as a function of payload and fuel loading An SOC is required.	B,C,D	None
3.	Equipment Operation.	See next	None
3.a.	All relevant instrument indications involved in the simulation of the helicopter must automatically respond to control movement or external disturbances to the simulated helicopter; e.g., turbulence or windshear. Numerical values must be presented in the appropriate units.	B,C,D	None
3.b.	Communications, navigation, caution, and warning equipment must be installed and operate within the tolerances applicable for the helicopter being simulated.	B,C,D	NA
3.c.	Simulated helicopter systems must operate as the helicopter systems operate under normal, abnormal, and emergency operating conditions on the ground and in flight.	B,C,D	None
3.d.	The simulator must provide pilot controls with control forces and control travel that correspond to the simulated helicopter. The simulator must also react in the same manner as the helicopter under the same flight conditions.	B,C,D	None
3.e.	Simulator control feel dynamics must replicate the helicopter simulated. This must be determined by comparing a recording of the control feel dynamics of the simulator to helicopter measurements. For initial and upgrade evaluations, the control dynamic characteristics must be measured and recorded directly from the flight deck controls, and must be accomplished in takeoff, cruise, and landing conditions and configurations.	C,D	None
4.	Instructor / Evaluator Facilities.	See next	None
4.a.	In addition to the flight crewmember stations, the simulator must have at least two suitable seats for the instructor/check airman and ANAC inspector. These seats must provide adequate vision to the pilot's panel and forward windows. All seats other than flight crew seats need not represent those found in the helicopter but must be adequately	B,C,D	The ANAC will consider alternatives to this standard for additional seats based on unique flight deck configurations

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	secured to the floor and equipped with similar positive restraint devices.		
4.b.	The simulator must have controls that enable the instructor/evaluator to control all required system variables and insert all abnormal or emergency conditions into the simulated helicopter systems as described in the sponsor's ANAC-approved training program, or as described in the relevant operating manual as appropriate.	B,C,D	None
4.c.	The simulator must have instructor controls for all environmental effects expected to be available at the IOS; e.g., clouds, visibility, icing, precipitation, temperature, storm cells, and wind speed and direction.	B,C,D	None
4.d.	The simulator must provide the instructor or evaluator the ability to present ground and air hazards.	C,D	For example, another aircraft crossing the active runway and converging airborne traffic.
4.e.	The simulator must provide the instructor or evaluator the ability to present the effect of re-circulating dust, water vapor, or snow conditions that develop as a result of rotor downwash.	C,D	This is a selectable condition that is not required for all operations on or near the surface.
5.	Motion System.	See next	
5.a.	The simulator must have motion (force) cues perceptible to the pilot that are representative of the motion in a helicopter.	B,C,D	For example, touchdown cues should be a function of the rate of descent (RoD) of the simulated helicopter.
5.b.	The simulator must have a motion (force cueing) system with a minimum of three degrees of freedom (at least pitch, roll, and heave). An SOC is required.	B	None
5.c.	The simulator must have a motion (force cueing) system that produces cues at least equivalent to those of a six-degrees-of-freedom, synergistic platform motion system (i.e., pitch, roll, yaw, heave, sway, and surge).	C,D	None

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	An SOC is required.		
5.d.	The simulator must provide for the recording of the motion system response time. An SOC is required.	B,C,D	None
5.e.	The simulator must provide motion effects programming to include the following:	See next	None
5.e.	(1) Runway rumble, oleo deflections, effects of ground speed, uneven runway, characteristics. (2) Buffets due to transverse flow effects. (3) Buffet during extension and retraction of landing gear. (4) Buffet due to retreating blade stall. (5) Buffet due to vortex ring (settling with power). (6) Representative cues resulting from touchdown. (7) High speed rotor vibrations.	B,C,D	None
	(8) Tire failure dynamics. (9) Engine malfunction and engine damage. (10) Airframe ground strike.	C,D	None
5.e.	(11) Motion vibrations that result from atmospheric disturbances.	D	For air turbulence, general purpose disturbance models are acceptable if, when used, they produce test results that approximate demonstrable flight test data.
5.f.	The simulator must provide characteristic motion vibrations that result from operation of the helicopter (for example, retreating blade stall, extended landing gear, settling with power) in so far as vibration marks an event or helicopter state, which can be sensed in the	D	The simulator should be programmed and instrumented in such a manner that the

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	flight deck.		characteristic buffet modes can be measured and compared to helicopter data.
6.	Visual System.	See next	Additional horizontal field-of-view capability may be added at the sponsor's discretion provided the minimum field-of-view is retained.
6.a.	The simulator must have a visual system providing an out-of-the-flight deck view.	B,C,D	None
6.b.	The simulator must provide a continuous field-of-view of at least 75° horizontally and 30° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage. An SOC must explain the geometry of the installation. An SOC is required.	B	None
6.c.	The simulator must provide a continuous visual field-of-view of at least 146° horizontally and 36° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously. Horizontal field-of-view is centered on the zero degree azimuth line relative to the aircraft fuselage. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage. An SOC must explain the geometry of the installation. Capability for a field-of-view in excess of the minimum is not required for qualification at Level C. However, where specific tasks require extended fields of view beyond the 146° by 36° (e.g., to accommodate the use of "chin windows" where the accommodation is either integral with or separate from the primary visual system display), then the extended fields of view must be provided. When considering the installation and use of augmented fields of view, the sponsor must meet with the ANAC to determine the training, testing, checking, and experience tasks for	C	Optimization of the vertical field-of-view may be considered with respect to the specific helicopter flight deck cut-off angle. The sponsor may request the ANAC to evaluate the FFS for specific authorization(s) for the following: Specific areas within the database needing higher resolution to support landings,

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	<p>which the augmented field-of-view capability may be required. An SOC is required.</p>		<p>take-offs and ground cushion exercises and training away from a heliport, including elevated heliport, helidecks and confined areas.</p> <p>For cross-country flights, sufficient scene details to allow for ground to map navigation over a sector length equal to 30 minutes at an average cruise speed.</p> <p>For offshore airborne radar approaches (ARA), harmonized visual/radar representations of installations.</p>
6.d.	<p>The simulator must provide a continuous visual field-of-view of at least 176° horizontally and 56° vertically per pilot seat. Both pilot seat visual systems must be operable simultaneously. Horizontal field-of-view is centered on the zero degree azimuth line relative to the aircraft fuselage. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of-view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage. An SOC must explain the geometry of the installation. Capability for a field-of-view in excess of the minimum is not required for qualification at Level D. However, where specific tasks require extended fields of view beyond the 176° by 56° (e.g., to accommodate the use of “chin windows” where the accommodation is either integral with or separate from the primary visual system display), then the extended fields of view must be provided. When considering the installation and use of augmented fields of view, the sponsor must meet with the ANAC to determine the training, testing, checking, and experience tasks for which the augmented field-of-view capability may be required.</p>	D	<p>Optimization of the vertical field-of-view may be considered with respect to the specific helicopter flight deck cut-off angle.</p> <p>The sponsor may request the ANAC to evaluate the FFS for specific authorization(s) for the following:</p> <p>Specific areas within the database needing higher resolution to support landings, take-offs and ground cushion exercises and training away</p>

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	An SOC is required.		from a heliport, including elevated heliport, helidecks and confined areas. For cross-country flights, sufficient scene details to allow for ground to map navigation over a sector length equal to 30 minutes at an average cruise speed. For offshore airborne radar approaches (ARA), harmonized visual/radar representations of installations.
6.e.	The visual system must be free from optical discontinuities and artifacts that create non-realistic cues.	B,C,D	Non-realistic cues might include image “swimming” and image “roll-off,” that may lead a pilot to make incorrect assessments of speed, acceleration and/or situational awareness.
6.f.	The simulator must have operational landing lights for night scenes. Where used, dusk (or twilight) scenes require operational landing lights.	B,C,D	None
6.g.	The simulator must have instructor controls for the following: (1) Visibility in statute miles (kilometers) and runway visual range (RVR) in ft. (meters). (2) Airport or landing area selection. (3) Airport or landing area lighting.	B,C,D	None

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
6.h.	Each airport scene displayed must include the following: (1) Airport runways and taxiways. (2) Runway definition: (a) Runway surface and markings. (b) Lighting for the runway in use, including runway threshold, edge, centerline, touchdown zone, VASI (or PAPI), and approach lighting of appropriate colors, as appropriate. (c) Taxiway lights.	B,C,D	None
6.i.	The simulator must provide visual system compatibility with dynamic response programming.	B,C,D	None
6.j.	The simulator must show that the segment of the ground visible from the simulator flight deck is the same as from the helicopter flight deck (within established tolerances) when at the correct airspeed and altitude above the touchdown zone.	B,C,D	This will show the modeling accuracy of the scene with respect to a pre-determined position from the end of the runway “in use.”
6.k.	The simulator must provide visual cues necessary to assess rate of change of height, height AGL, and translational displacement and rates during takeoffs and landings.	B	None
6.l.	The simulator must provide visual cues necessary to assess rate of change of height, height AGL, as well as translational displacement and rates during takeoff, low altitude/low airspeed maneuvering, hover, and landing.	C,D	None
6.m.	The simulator must provide for accurate portrayal of the visual environment relating to the simulator attitude.	B,C,D	Visual attitude vs. simulator attitude is a comparison of pitch and roll of the horizon as displayed in the visual scene compared to the display on the attitude indicator

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
6.n	The simulator must provide for quick confirmation of visual system color, RVR, focus, and intensity. An SOC is required.	C,D	None
6.o.	The simulator must be capable of producing at least 10 levels of occulting.	C,D	None
6.p.	Night Visual Scenes. The simulator must provide night visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Night scenes, as a minimum, must provide presentations of sufficient surfaces with appropriate textural cues that include self-illuminated objects such as road networks, ramp lighting, and airport signage, to conduct a visual approach, a landing, and airport movement (taxi). Scenes must include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by helicopter landing lights.	B,C,D	None
6.q.	Dusk (Twilight) Visual Scenes. The simulator must provide dusk (or twilight) visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport. The scene content must allow a pilot to successfully accomplish a visual landing. Dusk (or twilight) scenes, as a minimum, must provide full color presentations of reduced ambient intensity, sufficient surfaces with appropriate textural cues that include self-illuminated objects such as road networks, ramp lighting and airport signage, to conduct a visual approach, landing and airport movement (taxi). Scenes must include a definable horizon and typical terrain characteristics such as fields, roads and bodies of water and surfaces illuminated by representative aircraft lighting (e.g., landing lights). If provided, directional horizon lighting must have correct orientation and be consistent with surface shading effects. Total scene content must be comparable in detail to that produced by 10,000 visible textured surfaces and 15,000 visible lights with sufficient system capacity to display 16 simultaneously moving objects. An SOC is required.	C,D	None
6.r.	Daylight Visual Scenes. The simulator must have daylight visual scenes with sufficient scene content to recognize the airport, the terrain, and major landmarks around the airport.	C,D	None

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
	<p>The scene content must allow a pilot to successfully accomplish a visual landing. No ambient lighting may “washout” the displayed visual scene. Total scene content must be comparable in detail to that produced by 10,000 visible textured surfaces and 6,000 visible lights with sufficient system capacity to display 16 simultaneously moving objects. The visual display must be free of apparent and distracting quantization and other distracting visual effects while the simulator is in motion.</p> <p>An SOC is required.</p>		
6.s	The simulator must provide operational visual scenes that portray physical relationships known to cause landing illusions to pilots.	C,D	For example: short runways, landing approaches over water, uphill or downhill runways, rising terrain on the approach path, unique topographic features.
6.t.	<p>The simulator must provide special weather representations of light, medium, and heavy precipitation near a thunderstorm on takeoff and during approach and landing.</p> <p>Representations need only be presented at and below an altitude of 2,000 ft. (610 m) above the airport surface and within 10 miles (16 km) of the airport.</p>	C,D	None
6.u.	The simulator must present visual scenes of wet and snow-covered runways, including runway lighting reflections for wet conditions, and partially obscured lights for snow conditions.	C,D	The ANAC will consider suitable alternative effects.
6.v.	The simulator must present realistic color and directionality of all airport lighting.	C,D	None
6.w.	A minimum of one (1) representative airport and one (1) representative helicopter landing area model. The airport and the helicopter landing area may be contained within the same model. If this option is selected, the approach path to the airport runway(s) and the approach path to the helicopter landing area must be different. The model(s) used to meet the following requirements may be demonstrated at either a fictional or a real-world airport or helicopter landing area.	B	The model identifications must be acceptable to the ANAC, selectable from the IOS, and listed on the SOQ.

Entry Number	General Simulator Requirements	Simulator Levels	Notes/Information
6.x.	There must be at least the following airport/helicopter landing areas: (1) At least one (1) representative airport. (2) At least three representative non-airport landing areas, as follows: (a) At least one (1) representative helicopter landing area situated on a substantially elevated surface with respect to the surrounding structures or terrain (e.g., building top, offshore oil rig). (b) At least one (1) helicopter landing area that meets the definition of a “confined landing area.” (c) At least one (1) helicopter landing area on a sloped surface where the slope is at least 2½°.	C,D	The model identifications must be acceptable to the ANAC, selectable from the IOS, and listed on the SOQ.
7.	Sound System.	See next	None
7.a.	The simulator must provide flight deck sounds that result from pilot actions that correspond to those that occur in the helicopter.	B,C,D	None
7.b.	Volume control, if installed, must have an indication of the sound level setting.	B,C,D	None
7.c.	The simulator must accurately simulate the sound of precipitation, windshield wipers, and other significant helicopter noises perceptible to the pilot during normal and abnormal operations, and include the sound of a crash (when the simulator is landed in an unusual attitude or in excess of the structural gear limitations); normal engine sounds; and the sounds of gear extension and retraction. An SOC is required.	C,D	None
7.d.	The simulator must provide realistic amplitude and frequency of flight deck noises and sounds. Simulator performance must be recorded, compared to amplitude and frequency of the same sounds recorded in the helicopter, and made a part of the QTG.	D	None

Table C3 – Table of Tasks vs. Simulator Level – Subjective Requirements

The simulator must be able to perform the tasks associated with that level of qualification.

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
1.	Preflight Procedures.	See next	None
1.a.	Preflight Inspection (Flight deck Only) switches, indicators, systems, and equipment.	B,C,D	None
1.b.	APU/Engine start and run-up.	See next	None
1.b.1.	Normal start procedures.	B,C,D	None
1.b.2.	Alternate start procedures.	B,C,D	None
1.b.3.	Abnormal starts and shutdowns (hot start, hung start).	B,C,D	None
1.c.	Taxiing – Ground.	B,C,D	None
1.d.	Taxiing – Hover.	B,C,D	None
1.e.	Pre-takeoff Checks.	B,C,D	None
2.	Takeoff and Departure Phase.	See next	None
2.a.	Normal takeoff.	See next	None
2.a.1.	From ground.	B,C,D	None
2.a.2.	From hover.	C,D	None
2.a.3	Running.	B,C,D	None
2.b.	Instrument.	B,C,D	None
2.c.	Powerplant Failure During Takeoff.	B,C,D	None
2.d.	Rejected Takeoff.	B,C,D	None
2.e.	Instrument Departure.	B,C,D	None
3.	Climb.	See next	None

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
3.a.	Normal.	B,C,D	None
3.b.	Obstacle clearance.	B,C,D	None
3.c.	Vertical.	B,C,D	None
3.d.	One engine inoperative.	B,C,D	None
4.	In-flight Maneuvers.	See next	None
4.a.	Turns (timed, normal, steep).	B,C,D	None
4.b.	Powerplant Failure – Multiengine Helicopters.	B,C,D	None
4.c.	Powerplant Failure – Single-Engine Helicopters.	B,C,D	None
4.d.	Recovery From Unusual Attitudes.	B,C,D	None
4.e.	Settling with Power.	B,C,D	None
4.f.	Specific Flight Characteristics incorporated into the user’s ANAC approved flight training program.	B(a),C(a),D(a)	None
5.	Instrument Procedures.	See next	None
5.a.	Instrument Arrival.	B,C,D	None
5.b.	Holding.	B,C,D	None
5.c.	Precision Instrument Approach.	See next	None
5.c.1.	Normal – All engines operating.	B,C,D	None
5.c.2.	Manually controlled – One or more engines inoperative.	B,C,D	None
5.d.	Non-precision Instrument Approach.	B,C,D	None
5.e.	Missed Approach.	See next	None
5.e.1.	All engines operating.	B,C,D	None

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
5.e.2.	One or more engines inoperative.	B,C,D	None
5.e.3.	Stability augmentation system failure.	B,C,D	None
6.	Landings and Approaches to Landings.	See next	None
6.a.	Visual Approaches (normal, steep, shallow).	B,C,D	None
6.b.	Landings.	See next	None
6.b.1.	Normal/crosswind.	See next	None
6.b.1.a.	Running.	B,C,D	None
6.b.1.b.	From Hover.	C,D	None
6.b.2.	One or more engines inoperative.	B,C,D	None
6.b.3.	Rejected Landing.	B,C,D	None
7.	Normal and Abnormal Procedures.	See next	None
7.a.	Powerplant.	B,C,D	None
7.b.	Fuel System.	B,C,D	None
7.c.	Electrical System.	B,C,D	None
7.d.	Hydraulic System.	B,C,D	None
7.e.	Environmental System(s).	B,C,D	None
7.f.	Fire Detection and Extinguisher Systems.	B,C,D	None
7.g.	Navigation and Aviation Systems.	B,C,D	None
7.h.	Automatic Flight Control System, Electronic Flight Instrument System, and Related Subsystems.	B,C,D	None
7.i.	Flight Control Systems.	B,C,D	None

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
7.j.	Anti-ice and Deice Systems.	B,C,D	None
7.k.	Aircraft and Personal Emergency Equipment.	B,C,D	None
7.l.	Special Missions tasks (e.g., Night Vision goggles, Forward Looking Infrared System, External Loads and as listed on the SOQ.)	B(a),C(a),D	None
8.	Emergency procedures (as applicable).	See next	None
8.a.	Emergency Descent.	B,C,D	None
8.b.	Inflight Fire and Smoke Removal.	B,C,D	None
8.c.	Emergency Evacuation.	B,C,D	None
8.d.	Ditching.	B,C,D	None
8.e.	Autorotative Landing.	B,C,D	None
8.f.	Retreating blade stall recovery.	B,C,D	None
8.g.	Mast bumping.	B,C,D	None
8.h.	Loss of tail rotor effectiveness.	B,C,D	None
8.i.	Vortex recovery	B,C,D	None
9.	Postflight Procedures.	See next	None
9.a	After-Landing Procedures.	B,C,D	None
9.b.	Parking and Securing.	See next	None
9.b.1.	Rotor brake operation.	B,C,D	None
9.b.2.	Abnormal/emergency procedures.	B,C,D	None

Note: An “(a)” in the table indicates that the system, task, or procedure may be examined if the appropriate aircraft system or control is simulated in the FFS and is working properly.

Table C4 – Table of Tasks vs. Simulator Level – Subjective Requirements

The simulator must be able to perform the tasks associated with that level of qualification.

Entry Number	Subjective Requirements	Simulator Levels	Notes/Information
1.	Instructor Operating Station (IOS), as appropriate.	See next	None
1.a.	Power switch(es).	B,C,D	None
1.b.	Helicopter conditions.	B,C,D	e.g., GW, CG, Fuel loading, Systems, Ground. Crew
1.c.	Airports / Heliports / Helicopter Landing Areas	B,C,D	e.g., Selection, Surface, Presets, Lighting controls.
1.d.	Environmental controls.	B,C,D	e.g., Clouds, Visibility, RVR, Temp, Wind, Ice, Snow, Rain, and Windshear.
1.e.	Helicopter system malfunctions (Insertion / deletion)	B,C,D	None
1.f.	Locks, Freezes, and Repositioning.	B,C,D	None
2.	Sound Controls.	See next	None
2.a.	On / off / adjustment	B,C,D	None
3.	Motion / Control Loading System.	See next	None
3.a.	On / off / emergency stop	B,C,D	None
4.	Observer Seats / Stations.	See next	None
4.a.	Position / Adjustment / Positive restraint system.	B,C,D	None

APÊNDICE D (APPENDIX D)

QUALIFICATION PERFORMANCE STANDARDS FOR HELICOPTER FLIGHT TRAINING DEVICES

REQUISITOS DE DESEMPENHO PARA QUALIFICAÇÃO DE DISPOSITIVO DE TREINAMENTO DE VOO (FTD) DE HELICÓPTERO

(a) In order to be qualified at a particular qualification level, the FTD must meet the standards listed in tables D1, D2, D3 and D4 of this appendix, available only in english..

(a) Para ser qualificado a um determinado nível, o FTD deve cumprir os requisitos listados nas tabelas D1, D2, D3 e D4 deste apêndice, disponíveis apenas em língua inglesa.

(b) Except for level 4 FTD, each FTD must have a QTG, acceptable to the ANAC, that includes:

(b) Exceto para FTD nível 4, cada FTD deve possuir um QTG, aceito pela ANAC, contendo:

(1) Objective data obtained from traditional aircraft testing or another approved source;

(1) Dados objetivos obtidos de ensaio em voo da aeronave ou outra fonte de dados aprovada;

(2) The results of FTD objective tests;

(2) Os resultados dos testes objetivos do FTD;

(3) The results of FTD subjective tests;
and

(3) Os resultados dos testes subjetivos do FTD; e

(4) A description of the equipment necessary to perform the evaluation for initial qualification and the continuing qualification evaluations.

(4) Uma descrição do equipamento necessário para executar as avaliações para qualificação inicial e para qualificação recorrente.

Table D1 – General technical requirements for FTD levels – Helicopter

FTD Level	General technical requirements
4	<p>A Level 4 device is one that may have an open helicopter-specific flight deck area, or an enclosed helicopter-specific flight deck and at least one operating system.</p> <p>Air/ground logic is required (no aerodynamic programming required). All displays may be flat/LCD panel representations or actual representations of displays in the aircraft.</p> <p>All controls, switches, and knobs may be touch sensitive activation (not capable of manual manipulation of the flight controls) or may physically replicate the aircraft in control operation.</p> <p>See table D2 for more FTD requirements.</p>
5	<p>A Level 5 device is one that may have an open helicopter-specific flight deck area, or an enclosed helicopter-specific flight deck and a generic aerodynamic programming with at least one operating system and control loading representative of the simulated helicopter.</p> <p>The control loading need only represent the helicopter at an approach speed and configuration.</p> <p>All displays may be flat/LCD panel representations or actual representations of displays in the aircraft. Primary and secondary flight controls (e.g., rudder, aileron, elevator, flaps, spoilers/speed brakes, engine controls, landing gear, nosewheel steering, trim, brakes) must be physical controls.</p> <p>All other controls, switches, and knobs may be touch sensitive activation.</p> <p>See table D2 for more FTD requirements.</p>
6	<p>A Level 6 device is one that has an enclosed helicopter-specific flight deck and aerodynamic program with all applicable helicopter systems operating and control loading that is representative of the simulated helicopter throughout its ground and flight envelope and significant sound representation.</p> <p>All displays may be flat/LCD panel representations or actual representations of displays in the aircraft, but all controls, switches, and knobs must physically replicate the aircraft in control operation.</p> <p>See table D2 for more FTD requirements.</p>
7	<p>A Level 7 device is one that has an enclosed helicopter-specific flight deck and aerodynamic program with all applicable helicopter systems operating and control loading that is representative of the simulated helicopter throughout its ground and flight envelope and significant sound representation.</p> <p>All displays may be flat/LCD panel representations or actual representations of displays in the aircraft, but all controls, switches, and knobs must physically replicate the aircraft in control operation. It also has a visual system that provides an out-of-the-flight deck view, providing cross-flight deck viewing (for both pilots simultaneously) of a field-of-view of at least 146° horizontally and 36° vertically as well as a vibration cueing system for characteristic helicopter vibrations noted at the pilot station(s).</p> <p>See table D2 for more FTD requirements.</p>

Table D2– General FTD Requirements

Entry Number	General FTD Requirements	FTD Level	Notes/Information
1.	General Flight deck Configuration.	See next	None
1.a.	<p>The FTD must have a flight deck that is a replica of the helicopter, or set of helicopters simulated with controls, equipment, observable flight deck indicators, circuit breakers, and bulkheads properly located, functionally accurate and replicating the helicopter or set of helicopters. The direction of movement of controls and switches must be identical to that in the helicopter or set of helicopters.</p> <p>Crewmember seats must afford the capability for the occupant to be able to achieve the design “eye position.” Equipment for the operation of the flight deck windows must be included, but the actual windows need not be operable. Those circuit breakers that affect procedures or result in observable flight deck indications must be properly located and functionally accurate. Fire axes, extinguishers, landing gear pins, and spare light bulbs must be available, and may be represented in silhouette, in the flight simulator. This equipment must be present as near as practical to the original position.</p>	6,7	<p>For FTD purposes, the flight deck consists of all that space forward of a cross section of the flight deck at the most extreme aft setting of the pilots’ seats including additional, required crewmember duty stations and those required bulkheads aft of the pilot seats.</p> <p>Bulkheads containing only items such as landing gear pin storage compartments, fire axes and extinguishers, spare light bulbs, and aircraft documents pouches are not considered essential and may be omitted. If omitted, these items, or the silhouettes of these items, may be placed on the wall of the simulator, or in any other location as near as practical to the original position of these items.</p>
1.b.	<p>The FTD must have equipment (i.e., instruments, panels, systems, circuit breakers, and controls) simulated sufficiently for the authorized training/checking events to be accomplished. The installed equipment, must be located in a spatially correct configuration, and may be in a flight deck or an open flight deck area. Those circuit breakers that affect procedures or result in observable flight deck indications must be properly located and functionally accurate. Additional equipment required for the authorized training and checking events must be available in the FTD but may be located in a suitable location as near as practical to the spatially correct position. Actuation of this equipment must replicate the appropriate function in the helicopter.</p>	4,5	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	Fire axes, landing gear pins, and any similar purpose instruments need only be represented in silhouette.		
2.	Programming.	See next	None
2.a.	<p>The FTD must provide the proper effect of aerodynamic changes for the combinations of drag and thrust normally encountered in flight. This must include the effect of change in helicopter attitude, thrust, drag, altitude, temperature, and configuration.</p> <p>Levels 6 and 7 additionally require the effects of changes in gross weight and center of gravity.</p> <p>Level 5 requires only generic aerodynamic programming. An SOC is required.</p>	5,6,7	None
2.b.	<p>The FTD must have the computer (analog or digital) capability (i.e., capacity, accuracy, resolution, and dynamic response) needed to meet the qualification level sought.</p> <p>An SOC is required.</p>	4,5,6,7	None
2.c.	<p>Relative responses of the flight deck instruments must be measured by latency tests or transport delay tests, and may not exceed 150 milliseconds. The instruments must respond to abrupt input at the pilot's position within the allotted time, but not before the time that the helicopter or set of helicopters respond under the same conditions.</p> <ul style="list-style-type: none"> ● Latency: The FTD instrument and, if applicable, the motion system and the visual system response must not be prior to that time when the helicopter responds and may respond up to 150 milliseconds after that time under the same conditions. ● Transport Delay: As an alternative to the Latency requirement, a transport delay objective test may be used to demonstrate that the FTD system does 	5,6,7	<p>The intent is to verify that the FTD provides instrument cues that are, within the stated time delays, like the helicopter responses.</p> <p>For helicopter response, acceleration in the appropriate, corresponding rotational axis is preferred.</p>

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	not exceed the specified limit. The sponsor must measure all the delay encountered by a step signal migrating from the pilot's control through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the instrument display and, if applicable, the motion system, and the visual system.		
3.	Equipment Operation.	See next	None
3.a.	All relevant instrument indications involved in the simulation of the helicopter must automatically respond to control movement or external disturbances to the simulated helicopter or set of helicopters; e.g., turbulence or winds.	4(a),5,6,7	None
3.b.	<p>Navigation equipment must be installed and operate within the tolerances applicable for the helicopter or set of helicopters.</p> <p>Levels 6 and 7 must also include communication equipment (inter- phone and air/ground) like that in the helicopter.</p> <p>Level 5 only needs that navigation equipment necessary to fly an instrument approach.</p>	4(a),5,6,7	None
3.c.	<p>Installed systems must simulate the applicable helicopter system operation both on the ground and in flight. At least one helicopter system must be represented. Systems must be operative to the extent that applicable normal, abnormal, and emergency operating procedures included in the sponsor's training programs can be accomplished.</p> <p>Levels 6 and 7 must simulate all applicable helicopter flight, navigation, and systems operation.</p> <p>Level 5 must have functional flight and navigational controls, displays, and instrumentation.</p>	4(a),5,6,7	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
3.d.	The lighting environment for panels and instruments must be sufficient for the operation being conducted.	4,5,6,7	Back-lighted panels and instruments may be installed but are not required.
3.e.	The FTD must provide control forces and control travel that correspond to the replicated helicopter or set of helicopters. Control forces must react in the same manner as in the helicopter or set of helicopters under the same flight conditions.	6,7	None
3.f.	The FTD must provide control forces and control travel of sufficient precision to manually fly an instrument approach. The control forces must react in the same manner as in the helicopter or set of helicopters under the same flight conditions.	5	None
4.	Instructor or Evaluator Facilities.	See next	None
4.a.	In addition to the flight crewmember stations, suitable seating arrangements for an instructor/check airman and ANAC Inspector must be available. These seats must provide adequate view of crewmember's panel(s).	4,5,6,7	These seats need not be a replica of an aircraft seat and may be as simple as an office chair placed in an appropriate position.
4.b.	The FTD must have instructor controls that permit activation of normal, abnormal, and emergency conditions, as appropriate. Once activated, proper system operation must result from system management by the crew and not require input from the instructor controls.	4,5,6,7	None
5.	Motion System.	See next	None
5.a.	A motion system may be installed in an FTD. If installed, the motion system operation must not be distracting. If a motion system is installed and additional training, testing, or checking credits are being sought, sensory cues must also be integrated. The motion system must respond to abrupt input at the pilot's position within the allotted time, but not before the time when the helicopter responds under the same conditions. The motion system must be measured by latency tests or transport delay tests and may not exceed 150 milliseconds. Instrument response must not occur prior to motion	4,5,6,7	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	onset.		
5.b.	The FTD must have at least a vibration cueing system for characteristic helicopter vibrations noted at the pilot station(s).	7	May be accomplished by a “seat shaker” or a bass speaker sufficient to provide the necessary cueing.
6.	Visual System.	See next	None
6.a.	The FTD may have a visual system, if desired, although it is not required. If a visual system is installed, it must meet the following criteria:	See next	None
6.a.1.	The visual system must respond to abrupt input at the pilot’s position. An SOC is required.	4,5,6	None
6.a.2.	The visual system must be at least a single channel, non-collimated display. An SOC is required.	4,5,6	None
6.a.3.	The visual system must provide at least a field-of-view of 18° vertical / 24° horizontal for the pilot flying. An SOC is required.	4,5,6	None
6.a.4.	The visual system must provide for a maximum parallax of 10° per pilot. An SOC is required.	4,5,6	None
6.a.5.	The visual scene content may not be distracting. An SOC is required.	4,5,6	None
6.a.6.	The minimum distance from the pilot’s eye position to the surface of a direct view display may not be less than the distance to any front panel instrument. An SOC is required.	4,5,6	None
6.a.7.	The visual system must provide for a minimum resolution of 5 arc-minutes	4,5,6	None

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	<p>for both computed and displayed pixel size.</p> <p>An SOC is required.</p>		
6.b.	<p>If a visual system is installed and additional training, testing, or checking credits are being sought on the basis of having a visual system, a visual system meeting the standards set out for at least a Level A FFS (see Appendix A of this RBAC) will be required. A “direct- view,” non-collimated visual system (with the other requirements for a Level A visual system met) may be considered satisfactory for those installations where the visual system design “eye point” is appropriately adjusted for each pilot’s position such that the parallax error is at or less than 10° simultaneously for each pilot.</p> <p>An SOC is required.</p>	4,5,6	None
6.c.	<p>The FTD must provide a continuous visual field-of-view of at least 146° horizontally and 36° vertically for both pilot seats, simultaneously. The minimum horizontal field-of-view coverage must be plus and minus one-half (½) of the minimum continuous field-of- view requirement, centered on the zero degree azimuth line relative to the aircraft fuselage. Additional horizontal field-of-view capability may be added at the sponsor’s discretion provided the minimum field- of-view is retained. Capability for a field-of-view in excess of these minima is not required for qualification at Level 7. However, where specific tasks require extended fields of view beyond the 146° by 36° (e.g., to accommodate the use of “chin windows” where the accommodation is either integral with or separate from the primary visual system display), then such extended fields of view must be provided.</p> <p>An SOC is required and must explain the geometry of the installation.</p>	7	<p>Optimization of the vertical field-of-view may be considered with respect to the specific helicopter flight deck cut-off angle. When considering the installation/use of augmented fields of view, as described here, it will be the responsibility of the sponsor to meet with the ANAC to determine the training, testing, checking, or experience tasks for which the augmented field-of-view capability may be critical to that approval.</p>
6.d.	<p>A minimum of one (1) representative airport and one (1) representative helicopter landing area model.</p>	7	<p>Each model must be acceptable to the ANAC, selectable from the IOS, and listed on the SOQ</p>

Entry Number	General FTD Requirements	FTD Level	Notes/Information
	The airport and the helicopter landing area may be contained within the same visual model. If this option is selected, the approach path to the airport runway(s) and the approach path to the helicopter landing area must be different. The model(s) used to meet the following requirements may be demonstrated at either a fictional or a real-world airport or helicopter landing area.		
7.	Sound System	See next	None
7.a.	The FTD must simulate significant flight deck sounds resulting from pilot actions that correspond to those heard in the helicopter.	6,7	None

Table D3 - Minimum FTD Requirements – Subjective Requirements

The FTD must be able to perform the tasks associated with the level of qualification sought.

Entry Number	Subjective Requirements	FTD Level	Notes/Information
1.	1. Preflight Procedures.	See next	None
1.a.	Preflight Inspection (Flight deck Only) switches, indicators, systems, and equipment.	4(a),5(a),6,7	None
1.b.	APU/Engine start and run-up.	See next	None
1.b.1.	Normal start procedures.	4(a),5(a),6,7	None
1.b.2.	Alternate start procedures.	4(a),5(a),6,7	None
1.b.3.	Abnormal starts and shutdowns (hot start, hung start).	4(a),5(a),6,7	None
1.c.	Taxiing – Ground.	7	None
1.d.	Taxiing – Hover.	7	None
1.e.	Pre-takeoff Checks.	4(a),5(a),6,7	None
2.	2. Takeoff and Departure Phase.	See next	None
2.a.	Normal takeoff.	See next	None
2.a.1.	From ground.	7	None
2.a.2.	From hover.	7	None
2.a.3.	Running.	7	None
2.b.	Instrument.	6,7	None
2.c.	Powerplant Failure During Takeoff.	6,7	None
2.d.	Rejected Takeoff.	7	None
2.e.	Instrument Departure.	6,7	None
3.	3. Climb.	See next	None

Entry Number	Subjective Requirements	FTD Level	Notes/Information
3.a.	Normal.	6,7	None
3.b.	Obstacle clearance.	7	None
3.c.	Vertical.	6,7	None
3.d.	One engine inoperative.	6,7	None
4.	4. In-flight Maneuvers.	See next	None
4.a.	Turns (timed, normal, steep).	5,6,7	None
4.b.	Powerplant Failure - Multiengine Helicopters.	6,7	None
4.c.	Powerplant Failure - Single-Engine Helicopters.	6,7	None
4.d.	Recovery From Unusual Attitudes.	7	None
4.e.	Settling with Power.	7	None
5.	5. Instrument Procedures.	See next	None
5.a.	Instrument Arrival.	6,7	None
5.b.	Holding.	6,7	None
5.c.	Precision Instrument Approach.	See next	None
5.c.1.	Normal - All engines operating.	5,6,7	None
5.c.2.	Manually controlled - One or more engines inoperative.	6,7	None
5.d.	Non-precision Instrument Approach.	5,6,7	None
5.e.	Missed Approach.	See next	None
5.e.1.	All engines operating.	6,7	None
5.e.2.	One or more engines inoperative.	6,7	None
5.e.3.	Stability augmentation system failure.	6,7	None

Entry Number	Subjective Requirements	FTD Level	Notes/Information
6.	6. Landings and Approaches to Landings	See next	None
6.a.	Visual Approaches (normal, steep, shallow).	5,6,7	None
6.b.	Landings.	See next	None
6.b.1.	Normal/crosswind.	See next	None
6.b.1.a.	Running.	7	None
6.b.1.b.	From Hover.	7	None
6.b.2.	One or more engines inoperative.	7	None
6.b.3.	Rejected Landing.	7	None
7.	7. Normal and Abnormal Procedures.	See next	None
7.a.	Powerplant.	4(a),5(a),6,7	None
7.b.	Fuel System.	4(a),5(a),6,7	None
7.c.	Electrical System.	4(a),5(a),6,7	None
7.d.	Hydraulic System.	4(a),5(a),6,7	None
7.e.	Environmental System(s).	4(a),5(a),6,7	None
7.f.	Fire Detection and Extinguisher Systems.	4(a),5(a),6,7	None
7.g.	Navigation and Aviation Systems.	4(a),5(a),6,7	None
7.h.	Automatic Flight Control System, Electronic Flight Instrument System, and Related Subsystems.	4(a),5(a),6,7	None
7.i.	Flight Control Systems.	4(a),5(a),6,7	None
7.j.	Anti-ice and Deice Systems.	4(a),5(a),6,7	None
7.k.	Aircraft and Personal Emergency Equipment.	4(a),5(a),6,7	None

Entry Number	Subjective Requirements	FTD Level	Notes/Information
7.l.	Special Missions tasks (e.g., Night Vision goggles, Forward Looking Infrared System, External Loads and as listed on the SOQ.)	7	None
8.	8. Emergency procedures (as applicable).	See next	None
8.a.	Emergency Descent.	6,7	None
8.b.	Inflight Fire and Smoke Removal.	6,7	None
8.c.	Emergency Evacuation.	6,7	None
8.d.	Ditching.	7	None
8.e.	Autorotative Landing.	7	None
8.f.	Retreating blade stall recovery.	7	None
8.g.	Mast bumping.	7	None
8.h.	Loss of tail rotor effectiveness.	6,7	None
9.	9. Postflight Procedures.	See next	None
9.a	After-Landing Procedures.	4(a),5(a),6,7	None
9.b.	Parking and Securing.	See next	None
9.b.1.	Rotor brake operation.	4(a),5(a),6,7	None
9.b.2.	Abnormal/emergency procedures.	4(a),5(a),6,7	None

Note: An “(a)” in the table indicates that the system, task, or procedure may be examined if the appropriate aircraft system or control is simulated in the FTD and is working properly.

Table D4 - Table of FTD System Tasks – Subjective Requirements

In order to be qualified at the FTD qualification level indicated, the FTD must be able to perform at least the tasks associate with that level of qualification.

Entry Number	Subjective Requirements	FTD Level	Notes/Information
1.	Instructor Operating Station (IOS).	See next	None
1.a.	Power switch(es).	4(a),5,6,7	None
1.b.	Helicopter conditions.	4(a),5(a),6,7	e.g., GW, CG, Fuel loading, Systems, Ground. Crew
1.c.	Airports / Heliports / Helicopter Landing Areas	4(a),5,6,7	e.g., Selection, Surface, Presets, Lighting controls.
1.d.	Environmental controls.	4(a),5,6,7	e.g., Temp and Wind.
1.e.	Helicopter system malfunctions (Insertion / deletion)	4(a),5(a),6,7	None
1.f.	Locks, Freezes, and Repositioning (as appropriate).	4(a),5,6,7	None
1.g.	Sound Controls. (On / off / adjustment)	5,6,7	None
1.fh	Motion / Control Loading System, as appropriate. On / off / emergency stop	5(a),6,7	None
2.	Observer Seats / Stations.	See next	None
2.a.	Position / Adjustment / Positive restraint system.	4(a),5,6,7	None

Note: An “A” in the table indicates that the system, task, or procedure may be examined if the appropriate simulator system or control is in the FTD and is working properly.

APÊNDICE E (APPENDIX E)

QUALIFICATION PERFORMANCE STANDARDS FOR QUALITY MANAGEMENT SYSTEMS (QMS) FOR FSTD

(a) Each current sponsor of an FSTD must submit to the ANAC a proposed Quality Management System (QMS) program. The ANAC will notify the sponsor of the acceptability of the program, including any required adjustments. Within 6 months of the notification of acceptability, the sponsor must implement the program, conduct internal audits, make required program adjustments as a result of any internal audit, and schedule the ANAC initial audit..

(b) First-time FSTD sponsors must submit to the ANAC the proposed QMS program no later than 120 days before the initial FSTD evaluation. The ANAC will notify the sponsor of the acceptability of the program, including any required adjustments. Within 6 months of the notification of acceptability, the sponsor must implement the program, conduct internal audits, make required program adjustments as a result of any internal audit, and schedule the ANAC initial audit.

(c) The Director of Operations for a RBAC 119 certificate holder, the Chief Instructor for a RBAC 141 certificate holder, or the equivalent for a RBAC 142 sponsor must designate a Management Representative (MR) who has the authority to establish and modify the sponsor's policies, processes, and procedures regarding the QMS program for the recurring qualification and the daily use of each FSTD.

(d) The QMS policies, processes, or procedures must be maintained in a Quality Manual and will serve as the basis for the following:

REQUISITOS PARA O SISTEMA DE GERENCIAMENTO DA QUALIDADE (QMS) PARA FSTD

(a) Cada operador de FSTD deve enviar à ANAC uma proposta para o Programa de Gerenciamento da Qualidade (QMS). A ANAC notificará o operador sobre a aceitação do programa, incluindo quaisquer ajustes que forem necessários. Dentro de 6 meses da notificação de aceitação, o operador deve implantar o programa, conduzir auditorias internas, ajustar o programa como resultados dessas auditorias, e agendar a inspeção inicial com a ANAC.

(b) Novos operadores de FSTD devem enviar à ANAC uma proposta de QMS com no mínimo 120 dias de antecedência à data de avaliação inicial do FSTD. A ANAC notificará o operador sobre a aceitação do programa, incluindo quaisquer ajustes que forem necessários. Dentro de 6 meses da notificação de aceitação, o operador deve implantar o programa, conduzir auditorias internas, ajustar o programa como resultados dessas auditorias, e agendar a inspeção inicial com a ANAC.

(c) O diretor de operações de um detentor de certificado sob o RBAC 119, o instrutor chefe de um detentor de certificado sob o RBAC 141, ou o equivalente para um detentor sob o RBAC 142; deve designar um Representante do Operador (MR) que possua a autoridade para estabelecer e modificar as políticas, processos e procedimentos do programa de QMS para as qualificações recorrentes e o uso diário de cada FSTD.

(d) As políticas, processos ou procedimentos devem ser mantidos em um Manual de Qualidade, que servirá de base para:

(1) The sponsor-conducted initial and recurring periodic assessments;

(2) The ANAC-conducted initial and recurring periodic assessments; and

(3) The continuing surveillance and analysis by the ANAC of the sponsor's performance and effectiveness in providing a satisfactory FSTD for use on a regular basis.

(e) The sponsor must conduct assessments of its QMS program in segments. The segments will be established by the ANAC at the initial assessment, and the interval for the segment assessments will be every 6 months. The intervals for the segment assessments may be extended beyond 6 months as the QMS program matures, but will not be extended beyond 12 months. The entire QMS program must be assessed every 24 months.

(f) The periodic assessments conducted by the ANAC will be conducted at intervals not less than once every 24 months, and include a comprehensive review of the QMS program.

(1) As auditorias inicial e periódicas conduzidas pelo operador;

(2) As auditorias inicial e periódicas conduzidas pela ANAC;

(3) A vigilância continuada e o acompanhamento da ANAC acerca do desempenho e efetividade do operador em disponibilizar um FSTD satisfatório para uso frequente.

(e) O operador deve conduzir as auditorias do seu programa de QMS em segmentos. Os segmentos serão definidos pela ANAC na avaliação inicial, e cada segmento deverá ser avaliado a cada 6 meses. Esse intervalo poderá ser estendido além de 6 meses, a medida que o programa de QMS amadurecer, mas não poderá exceder 12 meses. O programa de QMS deverá ser inteiramente auditado a cada 24 meses.

(f) As avaliações periódicas conduzidas pela ANAC deverão ocorrer, no mínimo, uma vez a cada intervalo de 24 meses, e incluirá uma revisão completa do programa de QMS.