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OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION
TECHNICAL CENTRE, OPP SAFDURJUNG AIRPORT, NEW DELHI

CIVIL AVIATION REQUIREMENTS
SECTION 7 – FLIGHT CREW STANDARDS
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Subject: Requirements for the Qualification of Aircraft Full Flight Simulators and Synthetic Flight Training Devices.

1. INTRODUCTION

The availability of advanced technology has permitted greater use of Full Flight Simulators and Synthetic Flight Training Devices for training and checking of flight crew. The complexity, cost and operating environment of modern aircraft also have warranted broad use of advanced simulation. With the application of modern technology, simulators can provide more in-depth training that can be accomplished in an aeroplane and provide a very high transfer of learning and behavior from the simulator to aeroplane. The use of simulator for training, in lieu of an aircraft, offers safer flight training, fuel conservation, elimination of aircraft for training, reduction in adverse environmental effects, and reduced cost of training to the operators.

DGCA permits usage of aircraft flight simulators for various training purposes of flight crew such as initial, refresher, recurrent, transition, up-grade and others, which may be given credit towards the flight training requirements for issue and renewal of flight crew licenses, endorsements and ratings. It is, therefore, necessary that performance of the simulators be evaluated prior to the approval for use. Also it is essential that the Simulators and Synthetic Flight Training Devices be maintained to the performance level for which they have been certified.

This CAR lays down the rules governing the initial and continuing qualification and use of all aircraft Synthetic Flight Training Devices (FTD) levels 4, 5, and 6 and Full Flight Simulators (FFS) levels A, B, C and D used for meeting training, evaluation, or flight experience requirements for flight crewmember training, certification or qualification. This CAR is issued under the provisions of Rule 29 C and Rule 133A of the Aircraft Rules, 1937.

2. APPLICABILITY

No person or operator or organization shall use aircraft Full Flight Simulator and Synthetic Flight Training Devices for imparting training to flight crew for aircraft whose maximum take off weight is more than 5700 kg unless it has been approved by DGCA for the specific purpose of training.

3. DEFINITIONS

For the purpose of this CAR, abbreviations and definitions mentioned below shall be followed: -

- a. **Flight simulation training device:** Any one of the following three types of apparatus in which flight conditions are simulated on the ground:
 - i. *A flight simulator*, which provides an accurate representation of the flight deck of a particular aircraft type to the extent that the mechanical, electrical, electronic, etc. aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated;
 - ii. *A flight procedures trainer*, which provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electrical, electronic, etc. aircraft systems, and the performance and flight characteristics of aircraft of a particular class;
 - iii. *A basic instrument flight trainer*, which is equipped with appropriate instruments, and which simulates the flight deck environment of an aircraft in flight in instrument flight conditions.
- b. **Flight Simulator Data:** The various types of data used to design, manufacture, test and maintain the flight simulator.
- c. **Flight Simulator Evaluation:** A detailed appraisal of a flight simulator by the DGCA to ascertain whether or not the standard required for a specified qualification level is met.
- d. **Flight Training Device (FTD):** An FTD is a device that replicates 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 and the qualification performance standard (QPS) for a specific FTD qualification level (Level 4, 5 or 6).
- e. **Full Flight Simulator (FFS):** An FFS is a device that replicates a specific type, make, model, or series aircraft. It includes the equipment and computer programs necessary to represent aircraft operations in ground and flight conditions, a visual system providing an out-of-the-flight deck view, a system

that provides cues at least equivalent to those of a three-degree-of-freedom motion system, and has the full range of capabilities of the systems installed in the device and the QPS for a specific FFS qualification level (Level A, B, C or D).

- f. **Initial Training:** The training required for flight crew who have qualified and served in the same capacity on an aircraft.
- g. **Latency:** Additional time beyond that of the basic aeroplane perceivable response time due to the response time of the simulator. This includes the update rate of the computer system combined with the respective time delays of the motion system, visual system or instruments.
- h. **Manual Testing:** Simulator testing wherein the pilot conducts the test without computer inputs except for initial setup.
- i. **Objective Testing:** A quantitative assessment of the simulator functions based on comparison with data.
- j. **Qualification Test Guide (QTG) / Approval Test Guide (ATG):** A document designed to demonstrate that the performance and handling qualities of a Synthetic Training Device (Flight Simulator) agree within prescribed limits with those of the aeroplane and that all applicable regulatory requirements have been met. The QTG/ATG includes both the aeroplane and Flight Simulator data used to support the validation.
- k. **Recurrent Training:** The training for flight crew to remain adequately and currently proficient for each aircraft crew member position and type of operation the flight crew serves.
- l. **Statement of Compliance (SOC):** It is a certification from the operator in regard to evaluation of Flight Simulator that specific requirements have been met. It must provide references to needed sources of information for showing compliance, rationale to explain how the referenced material is used, mathematical equations and parameter values used and conclusion reached.
- m. **Subjective Testing:** A qualitative assessment of the simulator function based on established standards as interpreted by a suitably qualified person.
- n. **Transition Training:** The training required for flight crew who have qualified and served in the same capacity on another aircraft.
- o. **Upgrade Training:** The training for the flight crew who have qualified and served as Co-pilot on a particular type to acquire pilot in command rating on that aircraft.
- p. **Validation Data:** Data used to prove that the simulator performance corresponds to that of the aeroplane.

- q. **Validation Flight Test Data:** Performance, stability & control, and other necessary test parameters electrically or electronically recorded in an aeroplane using a calibrated data acquisition system of sufficient resolution and verified as accurate by the organisation performing the test to establish a reference set of relevant parameters to which like simulator parameters can be compared.
- r. **Visual System Response Time:** The interval from an abrupt control input to the completion of the visual display scan of the first video field containing the resulting different information

4. FOREIGN DIRECT INVESTMENT FOR SIMULATOR:

Aircraft Flight Simulators serve the same purpose as aircraft in flying training institutes for training of pilots. The permissible Foreign Direct Investment for institutes providing training using flight simulators shall be the same as is applicable to flying training institutes.

5. EVALUATION OF FLIGHT SIMULATOR

A simulator shall be evaluated by a DGCA nominated evaluation team with the operators nominated representatives and in accordance with Operations Circular (OC) 15 of 2014 FTD and FFS Qualification. Upon successful evaluation, the DGCA may grant certificate of approval certifying that the simulator meets the criteria of a specific level of qualification. After certification, approval for use of the simulator in a particular training program of an operator will be determined by the Flight Standards Bureau of DGCA responsible for oversight of the training organization of the operators.

5.1 SIMULATOR QUALIFICATION REQUIREMENTS AND TESTS

An operator shall follow standards specified in OC 15 of 2014 for evaluation of the simulators operated by him. A simulator will be evaluated in those areas of performance, which are essential to complete the flight crew training and checking process.

5.2 COMPOSITION OF EVALUATION TEAM

The simulator shall be evaluated in accordance with the Qualification Test Guide (QTG) or Master Qualification Test Guide (MQTG) for obtaining/maintaining a specific qualification level. These tests are to be conducted by a DGCA team which will be appointed by the DGCA and consist of a Flight Operations Inspector (FOI) trained for FFS approval and one FOI type rated and current on the aircraft. To evaluate supplied validation data road map when forming part of the data package, an engineer (aeronautical engineer) will be included in the team.

At the time of evaluation by the DGCA team, the following persons of the operator should be present.

- (i) A pilot holding PIC rating on the type of aircraft from the operator or main simulator users.
- (ii) Simulator Evaluation Specialist who has carried out the QTG/MQTG tests and the support staff to assist with the running of tests & operation of the instructor's station

5.3 INITIAL QUALIFICATION

Initial qualification of the simulator will be carried out in accordance with the qualification procedures for an FTD or FFS in OC 15 of 2014. Appendix B of the OC 15 of 2014 provides the qualification procedures for an FTD. Appendix C of the OC 15 of 2014 provides the qualification procedures for an FFS.

An operator seeking approval for simulator initial evaluation must submit the request in writing using the template provided in Appendix A of OC 15 of 2014 and NSP Form 01. This request should contain a compliance statement certifying that simulator:

- (a) meets all of the standards set forth in OC 15 of 2014 (Appendix B or Appendix C, depending on the simulator type),
- (b) that the cockpit configuration conforms to that of the aeroplane for which the simulator is being used,
- (c) that specific hardware and software configuration control procedures have been established,
- (d) and that the pilot(s) designated by the operator confirms that it is representative of the aeroplane in all function test area.

Operators seeking initial or upgrade evaluation of a flight simulator for an older aeroplane should be aware that performance and handling data for older aeroplanes may not be of sufficient quality to meet some of the test standards. The procedures for the requalification of an FTD or FFS that was previously qualified are contained in OC 15 of 2014.

5.4 MAJOR CHANGES / MODIFICATIONS TO FLIGHT SIMULATOR

A flight simulator should always, represent the aeroplane in ground, flight and environmental condition. Any major changes/ modifications that are carried out on the aeroplane and the aircraft systems influencing the above should be incorporated in the simulator, at the earliest. The procedures for major changes or modifications to an FTD or FFS are contained in OC 15 of 2014.

5.5 UPGRADE OF FLIGHT SIMULATOR TO A HIGHER LEVEL

An operator seeking approval for an FTD or FFS upgrade evaluation must submit a written request in accordance with OC 15 of 2014. If an upgrade is proposed, the operator shall give full details of the modifications carried out on the simulator to DGCA. If the upgrade takes place within the existing approval

validity period, a special evaluation is required to permit the simulator to continue to operate even at the previous qualification level. Once the flight simulator is upgraded, the previous validation test results shall not be used to validate simulator performance.

5.6 CONTINUING QUALIFICATION

For a simulator to retain its qualification, it will be evaluated at regular intervals using the approved MQTG. The continuing qualification tests shall be conducted within 60 days of its due date and documents submitted to DGCA at least 30 days in advance. Procedures for conducting an FTD or FFS continuing qualification evaluation are provided in OC 15 of 2014.

5.7 SPECIAL EVALUATION

During continuing qualification evaluations, if deficiencies are observed or it becomes apparent that the simulator is not being maintained to initial qualification standards, a special evaluation of the simulator may be conducted by the DGCA to verify its status. The simulator will lose its qualification if the simulator does not maintain the original simulator validation criteria during the special evaluation. The DGCA will advise the operator for resolving the deficiencies in an effective manner, if a deficiency is jeopardizing training requirements.

5.8 RELOCATION OF A FLIGHT SIMULATOR

In the event an operator shifts the simulator to a new location and its level of qualification is not changed, the following procedures shall be adopted.

- a) Inform the Regional DGCA (FSB) Office & DGCA Headquarters (FSB) of the proposed shifting of the simulator.
- b) Prior to use of the simulator at the new location, the operator should perform a typical recurrent validation and functions test. The results of such tests will be retained by the operator and be available for inspection by the DGCA team at the next evaluation or as requested.
- c) Any performance deviation observed during the recurrent validation test shall be intimated to DGCA HQ (FSB) through Regional DGCA (FSB) Office. The DGCA may schedule an evaluation prior to return to service.

At the discretion of DGCA the simulator be subjected to a reevaluation after the relocation is complete in accordance with the original certification criteria.

5.9 CHANGE OF OPERATOR

The new operator must accomplish all required administrative procedures including the submission of the currently approved MQTG through the Regional DGCA (FSB) Office to the DGCA HQ (FSB). The simulator may, at the discretion of the DGCA, be subjected to an evaluation in accordance with

the original qualification criteria. Its original qualification level will be restored only when the flight simulator performs to its original standard.

5.10 DEACTIVATION OF A CURRENTLY QUALIFIED SIMULATOR

- a) In the event an operator plans to deactivate a simulator for a prolonged period, Regional DGCA (FSB) Office and DGCA HQ (FSB) shall be informed and suitable controls established for the period the simulator is inactive.
- b) The operator will establish an appropriate procedure to ensure that the flight simulator can be restored to active status at its original qualification level.

6. CERTIFICATION OF FLIGHT SIMULATOR

Upon completion of evaluation in accordance with OC 15 of 2014, the Flight Operations Inspector or DGCA nominated officers will debrief the operator on the results of the tests. A report along with recommendations shall be submitted to DGCA.

A Certificate of approval will be issued by the DGCA Flight Standards Bureau after successful completion of evaluation tests conducted by DGCA provided all tests and documents prove adherence to requirements.

A Flight simulator qualification (Certificate of Approval) is valid for 2 years unless otherwise specified by the DGCA.

Qualification test for continued qualification may take place at any time within 60 days prior to the expiry date of the validity. The new period of validity shall continue from the expiry date of the previous qualification document.

In case tests for continued qualification are carried out after the expiry of the validity period, the approval may be revalidated for a further period of twelve months from the date of evaluation.

DGCA may refuse, revoke, suspend or vary a flight simulator qualification, if the provisions of this CAR are not satisfied.

7. REQUIREMENTS FOR SIMULATOR INSTALLATION

Flight Simulator operators shall have suitable premises and install the simulator in accordance with the manufacturer's recommendation, which support safe and reliable operation. The operator shall ensure that the simulator and its installation comply with the local Municipal authority regulations on health and safety.

8. INSPECTION, CONTINUING QUALIFICATION EVALUATION, AND MAINTENANCE REQUIREMENTS.

8.1 *Inspection.* No operator may use or allow the use of or offer the use of an FSTD for flight crewmember training, evaluation, or flight experience to meet any of the requirements of this chapter unless the operator does the following:

a) Accomplishes all appropriate objective tests each year as specified in the applicable Qualification Performance Standards (QPS) of OC 15 of 2014.

b) Completes a functional preflight check within the preceding 24 hours.

8.2 *Continuing qualification evaluation.*

a) This evaluation consists of objective tests, and subjective tests, including general FSTD requirements, as described in the applicable QPS or as may be directed by DGCA.

b) The operator must contact the DGCA regional FSB office to schedule the FSTD for continuing qualification evaluations not later than 60 days before the evaluation is due.

8.3 *Maintenance.* The operator is responsible for continuing corrective and preventive maintenance on the FSTD to ensure that it continues to meet the requirements of this CAR and the applicable QPS appendix of OC 15 of 2014. No operator may use or allow the use of or offer the use of an FSTD for flight crew member training, evaluation, or flight experience to meet any of the requirements of this chapter unless the operator does the following:

a) Maintains a discrepancy log.

b) Ensures that, when a discrepancy is discovered, the following requirements are met:

(i) A description of each discrepancy is entered in the log and remains in the log until the discrepancy is corrected as specified in Para 9.

(ii) A description of the corrective action taken for each discrepancy, the identity of the individual taking the action, and the date that action is taken is entered in the log.

(iii) The discrepancy log is kept in a form and manner acceptable to the DGCA and is kept in or adjacent to the FSTD. An electronic log that may be accessed by an appropriate terminal or display in or adjacent to the FSTD is satisfactory.

9. LOGGING FSTD DISCREPANCIES.

Each instructor, examiner, or representative of the DGCA conducting training, evaluation, or flight experience, and each person conducting the preflight

inspection who discovers a discrepancy, including any missing, malfunctioning, or inoperative components in the FSTD, must write or cause to be written a description of that discrepancy into the discrepancy log at the end of the FSTD preflight or FSTD use session.

10. OPERATION WITH MISSING, MALFUNCTIONING, OR INOPERATIVE COMPONENTS.

- 10.1 No person may knowingly use or allow the use of or misrepresent the capability of an FSTD for any maneuver, procedure, or task that is to be accomplished to meet training, evaluation, or flight experience requirements of this chapter for flight crewmember certification or qualification 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 maneuver, procedure, or task. The MMI policy should include the type of training restriction the operator will impose as an effect of the MMI.
- 10.2 Each MMI component as described in Para 10.1, 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 required or authorized by the DGCA.
- 10.3 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.

11. QUALITY MANAGEMENT SYSTEM AND CONFIGURATION MANAGEMENT

A Quality Management System, which is acceptable to the DGCA, should be established and maintained by the operator to ensure the correct maintenance and performance of the FSTD. The Quality Management System may be based upon established industry standards, such as ARINC report 433 (May 15th, 2001 or as amended) entitled "Standard Measurements for Flight Simulator Quality".

A configuration management system should be established and maintained to ensure the continued integrity of the hardware and software as from the original qualification standard, or as amended or modified through the same system.

12. FEES

Fees for flight simulator approval of aircraft type having AUW more than 5700 Kg is Rs Two Lakh only and for renewal flight simulator approval fees is Rs One Lakh only.

13. This CAR cancels CAR Section 2 Series 'O' Part XIII.

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