GOVERNMENT OF INDIA

OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

TECHNICAL CENTRE, OPP SAFDURJUNG AIRPORT, NEW DELHI

CIVIL AVIATION REQUIREMENTS
SECTION 7 – FLIGHT CREW STANDARDS
SERIES 'M', PART IV
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Subject: **Requirements for Evaluation, Certification and Maintenance of Helicopter Flight Simulators and Synthetic Flight Training Devices.**

1. INTRODUCTION

1.1 The availability of advanced technology has permitted greater use of flight simulators and Synthetic Flight Training Devices for training and checking of flight crew. The complexity, cost and operating environment of modern helicopter 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 a helicopter and provide a very high transfer of learning and behavior from the simulator to helicopter. The use of simulator for training, in lieu of a helicopter, offers safer flight training, fuel conservation, elimination of helicopter for training, reduction in adverse environmental effects, and reduced cost of training to the operators.

1.2 DGCA permits usage of helicopter 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 and also for the training of check pilots, instructors and examiners. 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.

1.3 This CAR lays down the requirements and procedures to be followed for evaluation, certification and maintenance and operation of flight simulators and Synthetic Flight Training Devices. This CAR is issued under the provisions of Rule 133A of the Aircraft Rules, 1937

2. APPLICABILITY

No person or operator or organization shall use helicopter flight simulator and Synthetic Flight Training Devices for imparting training to flight crew for helicopter unless it has been evaluated and approved by DGCA for the specific purpose of training.

3. DEFINITIONS

Flight simulation training device: A training device which is a Full Flight Simulator (FFS), a Flight Training Device (FTD), or a Flight & Navigation Procedures Trainer (FNPT). An FSTD can be any one of the following three types of apparatus in which flight conditions are simulated on the ground:

(i) **Full Flight Simulator (FFS)**. A full size replica of a specific type or make, model and series helicopter flight deck, including the assemblage of all equipment and computer programmes necessary to represent the helicopter in ground and flight operations, a visual system providing an out of the flight deck view, and a force cueing motion system.

(ii) **Flight Training Device (FTD).** A full size replica of a specific helicopter type's instruments, equipment, panels and controls in an open flight deck area or an enclosed helicopter flight deck, including the assemblage of equipment and computer software programmes necessary to represent the helicopter in ground and flight conditions to the extent of the systems installed in the device. It does not require a force cueing motion or visual system, however High level FTDs require visual systems.

(iii) **Flight and Navigation Procedures Trainer (FNPT).** A training device which represents the flight deck or cockpit environment including the assemblage of equipment and computer programmes necessary to represent a helicopter in flight operations to the extent that the systems appear to function as in a helicopter.

Flight Simulator Data: The various types of data used to design, manufacture, test and maintain the flight simulator.

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.

Latency: Additional time beyond that of the basic helicopter 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.

Manual Testing: Simulator testing wherein the pilot conducts the test without computer inputs except for initial setup.

Objective Testing: A quantitative assessment of the simulator functions based on comparison with data.

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 helicopter and that all applicable regulatory requirements have been met. The QTG includes both the helicopter and FLIGHT SIMULATOR data used to support the validation.

Recurrent Training: The training for flight crew to remain adequately and currently proficient for each helicopter crew member position and type of operation the flight crew serves.

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.

Subjective Testing: A qualitative assessment of the simulator function based on established standards as interpreted by a suitably qualified person.

Transition or Extension of Type Rating Training: The training required for flight crew who have qualified and served in the same capacity on another helicopter.

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 helicopter**.**

Validation Data: Data used to prove that the simulator performance corresponds to that of the helicopter.

Validation Flight Test Data: Performance, stability & control, and other necessary test parameters electrically or electronically recorded in an helicopter 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**.**

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. LEVELS OF FULL FLIGHT SIMULATORS

Simulators. There are four levels of simulators for qualification viz. Level A, Level B, Level C, Level D. Level A simulator has the lowest level of technical

complexity. Progressive increase of complexity and training capability are achieved as the level increases from A to D. Appendix "A" describes the minimum requirement for qualifying simulators to Level A, B, C or D along with the training capabilities. Appendix B gives the general standards for qualification. The qualification levels are classified based on:

a. Simulator Technology (Computer, motion, visual);
b. Closeness to the airplane simulated;
c. Objective tools to assess the quality of the simulation; and
d. Operational capabilities.

FTDs. There are three levels of FTDs for qualification, all of which are not supported by a motion platform, Level 1, Level 2 and Level 3. Level 1 simulator has the lowest level of technical complexity. Progressive increase of complexity and training capability are achieved as the level increases from 1 to 3. The Appendix "A" describes the minimum requirement for qualifying simulators to Level 1, 2 or 3. Appendix "A" describes the minimum requirement for qualifying simulators to Level A, B, C or D along with the training capabilities. Appendix B gives the general standards for qualification.

FNPTs. There are three levels of FNPTs for qualification, and are essentially meant for procedure training, Level I, Level II, Level III. Level I FNPT has the lowest level of technical complexity. Progressive increase of complexity and training capability are achieved as the level increases from I to III. The Appendix "A" describes the minimum requirement for qualifying simulators to Level I,II, OR III. Appendix "A" describes the minimum requirement for qualifying simulators to Level I/II/III along with the training capabilities. Appendix B gives the general standards for qualification.

5. FOREIGN DIRECT INVESTMENT FOR SIMULATOR

Helicopter Flight Simulators serve the similar purpose as helicopter 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. The applicable policies for FDI of government of India, as updated from time to time, shall apply.

6. EVALUATION OF FLIGHT SIMULATOR

A simulator shall be evaluated by DGCA in association with the operators nominated representatives. In case the initial evaluation is done by EASA/ FAA, the operator may coordinate with DGCA for a concurrent/ joint evaluation. On 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 Directorate for oversight of the training organization of the operators according to the level of qualification and the training programs approved for the TRTO/ training organization operating the flight simulators.

6.1 SIMULATOR QUALIFICATION REQUIREMENTS AND TESTS

6.1.1 A simulator shall be evaluated in the areas of performance which are essential to complete the flight crew training and checking process.This includes the simulator's longitudinal, lateral & directional responses, performance in hover, take off, climb, cruise, descent, approach and landing phases; control checks; pilot, co-pilot, flight engineer, and instructor station functional checks, and certain additional requirements depending upon the complexity or qualification level of the simulator. The motion system and visual system will be evaluated to ensure their proper operation. In case, a foreign regulating authority carries out evaluation for similar approval of the simulator facilities, DGCA may participate with the foreign team to witness the qualification tests. Approval for training programmes shall be granted according to the standards followed and the capability of the simulator operator.

6.1.2 The flight simulator shall be subjected to objective evaluation. However, pilot acceptance being an important consideration, the flight simulator will be subjected to validation, functional and subjective tests. The validation tests shall be used to compare flight simulator data with the helicopter data objectively so as to ensure that the tolerances are within specified limits. Functions and subjective tests provide a basis for evaluating flight simulator capability to perform over a period and to verify correct operation of the flight simulator. Tables of validation tests, functional and subjective tests are given at Appendix-C.

6.2 COMPOSITION OF EVALUATION TEAM

The simulator shall be evaluated in accordance with QTG/MQTG for obtaining/ maintaining a qualification level. These tests are to be conducted by a group of specialists which will be appointed by the DGCA and shall consist of representatives from Airworthiness and Flight Standards Directorates of DGCA.

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

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

6.3 INITIAL EVALUATION

6.3.1 Initial evaluation of the simulator is intended to assess the functions and test areas necessary for specific training and checking of aircrew. Such areas include simulator's directional responses, performance in hover, take off, climb, cruise, descent, approach and landing, control checks, cockpit, flight engineer and instructor station functions, and other additional requirements, such as motion and visual system checks, depending upon the complexity and

category of the simulator.

6.3.2 An operator seeking approval for simulator initial evaluation, must submit the request on a prescribed application form CA-2002H, given at "**Appendix D"** through regional office of DGCA. The application containing details of the FSTD, manufacturer, helicopter it represents, engines, visual system etc. and shall be submitted not less than two months prior to the requested evaluation date along with QTG and the date it was run. Completed QTGs can be submitted upto 30 days before the intended evaluation date as and the outstanding tests, if any, to be run on QTG, may be completed three weeks before the evaluation date. Final certification that the FSTD conforms to helicopter flight deck configuration of the FSTD operator & type of helicopter and that the simulated systems and sub-systems function equivalently to those in that helicopter, may be submitted not less than seven days before the evaluation date. It will also certifiy that evaluation team (which will also include a qualified pilot) has assessed the performance and the flying qualities of the FSTD and the same conforms/ represents to that of the designated helicopter. The regional office of DGCA will then forward the application with their comments/ recommendation to at DGCA headquarters for scheduling an evaluation of the proposed simulator.

6.3.3 The fees to be submitted alongwith the application shall be as per the Rule 133C of The Aircraft Rules, 1937.

6.3.4 The operator may opt for QTG/ATG validation tests to be conducted while the simulator is at the manufacturer's facility. Tests at the manufacturer's facility shall be accomplished at the latest practical time prior to disassembly and shipment. In such cases the operator shall validate simulator performance at the final location by repeating these validation tests with QTG and submit results of tests to DGCA. The number and quntum of tests to be repeated shall be decided by the DGCA prior to commencement of the validation process.The QTG must be clearly annotated to indicate when and where each test was accomplished.

6.3.5 In case of a initial approval, DGCA may carry out a concurrent evaluation along with FAA/ EASA(JAA). The request for such evaluation may be submitted at the same time as the request to FAA or EASA/JAA. The QTG will be approved after the completion of the initial or upgrade evaluation and all discrepancies in the QTG have been corrected. This document, after incorporation of the DGCA witnessed test results becomes the Master QTG (MQTG). The MQTG will then be used as a guide for future evaluations.

6.3.6 The operators seeking initial or upgrade evaluation of a flight simulator for older helicopters may be required to acquire additional flight test data as the performance and handling data for such helicopters may not be of sufficient quality to meet some of the test standards.

6.3.7 During flight simulator evaluation, if a problem is encountered with a particular validation test, the test(s) may be repeated to ascertain, whether the error(s) pertain to the test equipment or the simulator setup. If the problem persists,

the operator shall offer alternate test results, relating to the test(s) in question. The validation tests that do not meet the test(s) criteria shall be addressed to the satisfaction of the DGCA.The explanatory material for the tests are placed at appendix C .

6.4 MAJOR CHANGES / MODIFICATIONS TO FLIGHT SIMULATOR

6.4.1 A flight simulator shall always, represent the helicopter in ground, flight and environmental condition. Any major changes/ modifications that are carried out on the helicopter and the helicopter systems influencing the above should be immediately incorporated in the simulator under intimation to DGCA. The head of Training shall be responsible for incorporating such modifications on the simulator however, in case of any ambiguity the same may be referred to the DGCA.

6.4.2 Up-gradation to the hardware and software that affect flight or ground dynamics shall be incorporated on the simulator to improve the performance of the simulator by reducing the latency. These up-gradations shall be intimated, in writing, to the Regional DGCA office. The operator shall maintain a configuration control system to ensure the continued integrity of the simulator and to account for changes incorporated. Modifications, which affect flight or ground dynamics, system function and significant QTG revisions may require a DGCA evaluation ofthe simulator. The operator shall prepare amendments to any affected validation tests for testing the simulator to the new criteria. DGCA shall be informed in advance of any such major changes and to carry out tests for verification of these amendments. A special evaluation of the simulator may be carried out by the DGCA prior to returning it to training.

6.5 UPGRADE OF FLIGHT SIMULATOR TO A HIGHER LEVEL

6.5.1 An operator seeking approval for simulator upgrade evaluation must submit the request on a prescribed application form as per para 6.3.2. A flight simulator may be upgraded to a higher qualification level. In this case a special evaluation as followed for initial evaluation as per para 6.3 shall be carried out before the award of a higher level of qualification.

6.5.2 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.

6.6 RECURRENT EVALUATION

For a simulator to retain its qualification, it will be evaluated at regular intervals using the approved MQTG. Unless otherwise determined by DGCA, recurrent evaluations will be accomplished annually, by a Simulator Evaluation Specialist (a suitably trained person in Simulator testing). DGCA may carry out recurrent evaluation on sample basis, for renewal of the approval. However,

operators may carry out the tests every 4 months taking one third of the MQTG at a time. The recurrent evaluation tests shall be conducted within 30 days of its due date and documents submitted to DGCA.

6.7 SPECIAL EVALUATION

During recurrent 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.

6.8 RELOCATION OF A FLIGHT SIMULATOR/ CHANGE OF OPERATOR

Relocation of Flight Simulator at new location shall require fresh approval. In the event an operator shifts the simulator to a new location or the simulator has been acquired by new operator, the operator shall apply fresh for its approval prior to commencement of activities at the new location. While evaluating the application for approval of simulator for new operator or at new loction, the DGCA may waive off some of the tests vis-à-vis original qualification criteria/ tests required for initial approval of the simulator. The original qualification level will be restored only when the flight simulator performs to its original standard.

6.9 DEACTIVATION OF A CURRENTLY QUALIFIED SIMULATOR

6.9.1 In the event an operator intending to deactivate a simulator for a prolonged period, DGCA shall be informed and procedure recommended by the simulator manufacturer shall be followed.

6.9.2 The operator will establish an appropriate procedure to ensure that the flight simulator can be restored to active status at its original qualification level.

7. CERTIFICATION OF FLIGHT SIMULATOR

7.1 A Certificate of approval will be issued by the DGCA after successful completion of evaluation tests conducted by DGCA and shall be valid for one year unless otherwise specified by the DGCA.

7.2 Qualification test for revalidation/renewal of approval may be carried out 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. However if the qualification tests 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.

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

8. REQUIREMENTS FOR SIMULATOR INSTALLATION

8.1 Flight Simulator operators shall have suitable premises which support safe and reliable operation of the simulator.

8.2 The operator shall ensure that the simulator and its installation comply with the local Municipal authority regulations on health and safety. The operator shall prepare a circular on the following aspects, which shall be circulated to simulator occupants and maintenance personnel on simulator safety to, ensure that they are aware of the following minimum requirements are met with;

a) Availability of Safety equipment;
b) Arrangement in the simulator in case of emergency;
c) Adequate fire/ smoke detection, warning and suppression, arrangement to ensure the safe passage of personnel from the simulator.
d) Adequate protections against electrical, mechanical, hydraulic;
e) pneumatic hazard including those arising from the control loading & motion systems; and
f) Availability of the following items:

i) Two-way communication system, which remains operational in the event of total power failure;
ii) Emergency lighting;
iii) Escape exits & facilities;
iv) Occupant restraints (seats, seat belts etc.);
v) External warning of motion and access ramp or stairs activity;
vi) Danger area markings;
vii) Guard rails and gates;
viii) Motion & control loading, emergency stop controls accessible from either pilot and instructor seats;
ix) A manually or automatically operated electrical power isolation switch; and
x) Motion system and access ramp should be able to be operated from outside by maintenance personnel in emergency.

8.3 The simulator safety features such as emergency stops and emergency lighting shall be checked regularly by the flight simulator operator at least once a year and the results are to be recorded.

9. RECATEGORISATION OF FLIGHT SIMULATORS

9.1 Flight simulators that are approved prior to issue of this CAR require to be recategorised after evaluating them against the standards laid own in this CAR.

9.2 Flight simulators that can not be recategorised against standards laid down in this CAR but that have a primary reference document used for their testing, may be qualified as OA, OB, OC or OD (the prefix O-stands for 'old'). The credits/ training tasks approved earlier will remain valid,unless revised by

DGCA.

9.2.1 To gain and maintain an equivalent qualification level, these flight simulators shall be assessed areas essential to completing the flight crewmember training and checking process; which includes:

i) Longitudinal, lateral and directional handling qualities;
ii) Performance on the ground and in the air;
iii) Specific operations where applicable in flight deck configuration;
iv) Functioning during normal, abnormal, emergency and wherever abnormal operations are applicable;
v) Instructor station function and simulator control; and
vi) Additional requirements depending on the qualification level and the installed equipment.

9.2.2 The flight simulator shall be subjected to:

i) Validation tests; and
ii) Functions and subjective tests.

9.3 Flight simulator that cannot be recategorised and that do not have a primary reference document used for their testing shall be qualified by special arrangement. Such simulator will be issued with special categories and shall be subjected to functions and subjective tests.

Note: Flight simulators that have not been approved earlier will be evaluated in accordance with any one of the provisions described above as applicable. Operators shall make all efforts to get the simulator evaluated for approval at the earliest possible time but not later than six months from the effective date of this CAR. No credit for training for such simulators will be allowed till they are approved by DGCA.

10. QUALITY SYSTEM

The flight simulator operator shall establish a Quality System to the satisfaction of DGCANecessary guidelines for establishing such quality system are given in Appendix- E are to be followed for establishing the Quality System.

10.1 MANAGER (QUALITY SYSTEM)

A suitable qualified person shall be nominated to act as Manager (Quality System) and shall be approved by the DGCA. He will be responsible for management of Quality System, monitoring, and taking corrective action. The operator shall ensure that the person proposed the post have sufficient experience in carrying out qualification tests and flight simulator maintenance or shall receive appropriate training by the simulator manufacturer.

10.2 QUALITY SYSTEM POLICY

Manager (Quality System) shall prepare a Quality Manual detailing the organization structure, duties and responsibilities of the persons shown in the organization structure, policies, procedures and practices consistent with DGCA requirements and the broad aims of the Quality System, intended to achieve. The quality policy shall reflect the policies of the operator and procedures to be followed so as to ensure continued compliance with DGCA requirements together with any additional standards specified by the operator. The Quality Manual shall be prepared in accordance with the guidelines given in Appendix E and requires to be approved by DGCA.

Suitably qualified engineers will assist the Manager (Quality System) in maintaining the simulator to the appropriate standard.

Manager (Quality System) will be fully responsible for proper functioning of the Quality System including the frequency, format and structure of the internal management evaluation activities as enunciated in the approved Quality Manual.

11. SIMULATOR MAINTENANCE PROGRAMME

The simulator operators should evolve a maintenance program based on the recommendations of the simulator manufacturer and using their own operational experience and documented in the Quality Manual. The maintenance program should consist of:

a. Periodic checks at regular intervals as specified by the manufacturer;
b. Establishing procedures for reporting of defects/ defect rectification, analysis and taking preventive maintenance;
c. Preparation of "Allowable Deficiency List" (ADL), similar to helicopter MEL, for better utilization of the simulator;
d. Making timely replacement action of major components, as recommended by the manufacturer, to reduce down time of simulator;
e. Incorporating modification on the simulator to reflect the changes in the helicopter which are essential for training and checking. Incorporating modifications of hardware & software, as an upgrade, which may affect flight, ground handling and performance or any major modifications of the motion or visual system.

11.1 PERIODIC INSPECTION

Comprehensive schedules for inspection of simulator should be prepared by Manager (QS). The schedules should be prepared on the basis of:

(a) the manufacturer's maintenance manual;
(b) service bulletins;
(c) service letters;
(d) alert bulletins etc and may comprise of daily, weekly, monthly, six monthly inspections etc.

The inspections shall be carried out and certified by suitably qualified and trained persons. The Manager(QS) shall ensure that only appropriately qualified personnel will carry out the maintenance inspection. The maintenance procedures to be followed shall be reflected in the approved Quality Syatem Manual and the written records shall bemaintained for all maintenance activities.

11.2 DEFECT RECTIFICATION AND ANALYSIS

11.2.1 All defects observed during operation /maintenance / QTG tests shall be rectified and recorded in a separate register maintained for this purpose. The register shall be submitted to the Manager (Quality System) for his scrutiny and further necessary action.

11.2.2 The defects observed should be rectified by duly qualified / trained/ experienced personnel as per the policies and procedures laid down in the approved Quality System Manual.

11.2.3 A "Daily Shift Register (Maintenance)" shall be maintained by the operator so that any action taken on rectification of defect/general maintenance carried out by the previous shift engineer will be known to the engineer who is on duty.

11.2.4 Defects of repetitive nature should be given utmost importance and should be investigated thoroughly with the help of manufacturer. Action taken on such defects shall be intimated in writing to the Regional DGCA office, within a period of one month.

11.3 PREVENTIVE MAINTENANCE

The Manager (Quality System) shall ensure that all major components requiring bench check/ calibration / overhaul at stipulated intervals are replaced within the stipulated intervals as per the list. Copies of this list should be made available to the simulator maintenance engineers for appropriate action during simulator maintenance. The Manager (Quality System) may reduce component life if number of premature removals are experienced. Sufficient float level of spares shall be kept available for maintenance of the simulator.

11.4 ALLOWABLE DEFICIENCY LIST (ADL)

Allowable Deficiency List (ADL) which is similar to helicopter MEL (Minimum Equipment List) shall be prepared by Manager (QS) based on manufacturer's ADL in consultation with the pilot instructors. The list shall contain 'GO'/'NO GO' items, along with explanation for operation of simulator with 'GO' items. The ADL will provide to the simulator instructor the services that are available for training, with restrictions/ limitations, if any, on the operational aspects, against the inoperative item. The ADL may be equal to or more stringent than the manufacturer's ADL. A copy of the ADL shall be submitted to the regional DGCA office for approval. A copy of ADL shall always be kept in the simulator

for reference of the crew.

11.4.1 While invoking the provisions of ADL, the simulator operator shall establish procedure and follow the following guidelines for proper conduct of simulator training;

a) The simulator engineer shall notify the simulator instructor/scheduling office of the inoperative component/item, and wherever possible, provide an estimated time for replacement;

b) The simulator engineer shall notify the simulator instructor, the restrictions/ limitations imposed on the training, due to failure of any of the item;

c) The simulator instructor shall exercise his judgment and decide on the type of training that he can undertake, based on whether the inoperative item is required to meet training objectives for a particular crew position or for a particular phase of training. The instructor may reject the training if either of such conditions exist.

d) In such occasions, simulator instructor may choose the type of training, which does not involve the failed item(s). If the simulator instructor accepts the simulator for training, under ADL he shall specify the restrictions that apply, such as 'training in specific maneuvers', in the snag registers and also carry out necessary placarding at prropriate place in the simulator.

12. GENERAL CONDITIONS

12.1 Periodical evaluation checks of the simulators shall be carried out by the DGCA approved pilot SFI(H)/SFE(H)/instructors/ examiners who are qualified on the type and DGCA nominated officers, to confirm objectively that the simulator performance is within the specified tolerance limits for their revalidation, and that it has been maintained as required.

12.2 If the evaluation for certification or renewal reveals any significant deficiency(ies) in the performance of the simulator, the evaluation process may be repeated. In case the deficiencies persist and the simulator does not meet the required criteria but can perform satisfactorily to lower criteria, DGCA may certify the simulator for the lower criteria performance.

12.3 Any time an approved simulator is reinstalled at the new location/ site it requires a certification to the standard of initial approval.

12.4 The operator shall ensure the serviceability of the simulator must conform to the standard for which it qualifies as a substitute for flight check/ flying experience. Failure to comply with this will render the approval of simulator and the checks/ flying done on such simulator, invalid.

12.5 The operator shall ensure that the simulator conforms to the standards/

qualifications for which it was approved throughout the period of its approval. The failure to comply with this will render the approval of simulator and the checks/ flying done on such simulator, invalid

Sd/-
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APPENDIX 'A'

MINIMUM REQUIREMENTS FOR FFS QUALIFICATION AND TRAINING CAPABILITIES FULL FLIGHT SIMULATORS (FFS)

Level	General Technical Requirements	Training Capabilities
LEVEL A	An enclosed full-scale replica of the helicopter cockpit/flight deck with representative pilots seats, including simulation of all systems, instruments, navigational equipment, communications and caution and warning systems. An Instructor's station with seat shall be provided and at least one additional seat for inspectors/observers. Static control forces and displacement characteristics shall correspond to that of the replicated helicopter and they shall reflect the helicopter under the same static flight conditions. Representative/generic aerodynamic data tailored to the specific helicopter type with fidelity sufficient to meet the Objective Tests may be used. Functions and Subjective Tests are 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. A motion system having a minimum of three degrees of freedom (pitch, roll, and heave) to accomplish the required training tasks shall be provided. The visual system shall provide at least 45 degrees horizontal and 30 degrees vertical field of view per pilot. A night/dusk scene is acceptable. The response to control inputs shall not be greater than 150 milliseconds more than that experienced on the helicopter.	• Crew procedure training. • MCC • Instrument Flight training. and Navigation during • Transition/Conversion training

LEVEL B	**As for Level A plus** Validation Flight Test Data shall 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 shall be derived from validation Flight Test Data. A reduced six-axis motion performance envelope is acceptable. The visual system shall provide at least 75 degrees horizontal and 40 degrees vertical field of view per pilot.	**As for Level A plus** • Crew procedure training. • Instrument Flight training and Navigation during Transition/ Conversion training • System emergencies except OEI and TR emergencies. • MCC
LEVEL C	**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 150 degrees horizontal and 40 degrees vertical. The sound simulation shall include the sounds of precipitation and significant helicopter noises perceptible to the pilot and shall be able to reproduce the sounds of a crash landing. The response to control inputs shall not be greater than 100 milliseconds more than that experienced on the helicopter. Turbulence and other atmospheric models shall be provided to support the training, testing and checking credit sought.	**As for Level B plus:** • Instrument training and IR • revalidation/renewal • Recency • CRM Training, as part of approved course. • All LOFT • MCC training • Type rating extension training from MET TO MET including OEI and TR emergencies, and Cat A trg
LEVEL D	**As for Level C plus:** A full Daylight/Dusk/Night visual system is required with a continuous field of view per pilot of not less than 180 degrees horizontal and 60 degrees vertical and there shall be complete fidelity of sounds and motion buffets.	**As for Level C plus:** Type rating extension training from SET TO MET including OEI and TR emergencies, and Cat A trg.

MINIMUM REQUIREMENTS FOR FTD QUALIFICATION AND TRAINING CAPABILITIES FIXED TRAINING DEVICES (FTD)

Level	General Technical Requirements	Training Capabilities
1	• Type specific with at least one system fully represented to support the training task required. • A cockpit/flight-deck, sufficiently closed off to exclude distractions. • A full size panel of replicated system or systems with functional controls and switches. • Lighting environment for panels and instruments sufficient for the operation being conducted. • Flight-deck circuit breakers located as per the helicopter and functioning accurately for the system(s) represented. • Aerodynamic and environment modelling sufficient to permit accurate systems operation and indication. • Navigational data with corresponding approach facilities where replicated. • Suitable seating arrangements for the instructor/examiner and Authority's inspector. • Proper system(s) operation resulting from management by the flight crew independent from instructor control inputs. • Instructor's controls to insert abnormal or emergency conditions into the helicopter systems. • Independent freeze and reset facilities. Appropriate control forces and control travel. Appropriate flight deck sounds.	Could be considered suitable for selective system management credits (except for pilot manual control handling skills) as follows: - part of an approved conversion/transition course, - recurrent training/checking.
2	As for level 1 with the following additions or amendments: • All systems fully represented. • Lighting environment as per helicopter. • Representative/ generic aerodynamic data tailored to the specific helicopter with the fidelity to meet the objective tests. • Adjustable crewmember seats. • Flight control characteristics representative of the helicopter. • A visual system (night/dusk and day) capable of providing a field-of-view of a minimum of 150 degrees horizontally from the middle eye point and 40 degrees vertically • A visual data base sufficient to support the training requirements • Significant flight deck sounds. • On board Instructor station with control of atmospheric conditions and freeze and reset.	• Type rating training, except for hover training, and OEI/ TR emergencies systems • Management,initial and recurrent training. • Instrument training and IR revalidation/ renewal • Recency • CRM Training, as part of approved course. • LOFT limited to Route and area familiarization • MCC training

3	As for level 2 with the following additions or amendments: • Validation flight test data as the basis for objective testing of flight, performance and systems characteristics • Visual system (night/dusk/day) capable of providing a field of view of a minimum of • 150 degrees horizontally from the middle eye point and 60 degrees vertically.	• Type rating training, except for hover training, and OEI/ TR emergencies • Systems management, • Initial and recurrent training, • Instrument training and IR • revalidation/renewal • Recency • CRM Training, as part of approved course. • LOFT limited to Route and area familiarization • MCC training

MINIMUM REQUIREMENTS FOR FNPT QUALIFICATION AND TRAINING CAPABILITIES

Device	General Technical Requirements	Credits
FNPT Type I	1. A cockpit or flight deck sufficiently enclosed to exclude distraction, which will replicate that of a helicopter and in which the switches and all the controls will operate as, and represent those in a helicopter. 2. Instruments, equipment, panels, systems, primary and secondary flight controls sufficient for the training events to be accomplished shall be located in a spatially correct position. 3. Lighting environment for panels and instruments shall be sufficient for the operation being conducted. 4. In addition to the pilots' stations, suitable viewing arrangements for the instructor shall be provided allowing an adequate view of the crew members' panels and station. 5. Effects of aerodynamic changes for various combinations of airspeed and power normally encountered in flight, including the effect of change in helicopter attitude, sideslip, altitude, temperature, and initial mass. 6. Navigation equipment corresponding to that of a helicopter, with operation within the tolerances typically applied to the airborne equipment. This shall include communication equipment (interphone and air/ ground communications systems). 7. Control forces and control travel shall broadly correspond to those of a helicopter. 8. Complete navigational data for at least 5 different appropriate heliports with corresponding precision and non-precision approach procedures including current updating within a period of 3 months. All navigational aids, including enroute aids should be usable, if within range, without restriction and without instructor intervention. 9. Engine and rotor sounds shall be available. 10. The following shall be available: - variable effects of wind and turbulence; - hard copy of map and approach plot;	Credits as decided by DGCA in accordance with credits permitted by the regulatory authority to whose standards the FNPT was manufactured. In order to be used for helicopter type specific training, testing and checking the device shall also be qualified as a Flight Training Device or Flight Simulator.

	- provision for position freeze, flight freeze and repositioning facility; - Instructor controls necessary to - perform the training task; 11. Reset the FNPT to minimum IMC speed or above; 12. Allow for selective failure of basic flight instruments and navigation equipment. 13. A Qualification Test Guide	
FNPT Type II	**As for Type I with the following additions or amendments**: 1. The flight deck, including the instructor's station, shall be enclosed. There shall be made a provision for an observer. 2. Circuit breakers shall function correctly when involved in procedures or malfunctions requiring or involving flight crew response. 3. Crewmembers seats shall be provided with sufficient adjustment to allow the occupant to achieve the design eye reference position appropriate to a helicopter and for the visual system to be installed to align with that eye position. 4. Generic ground handling and ground effects models shall be provided to enable lift-off, hover and touch down effects to be simulated and harmonised with the sound and visual systems. 5. Systems shall be operative to the extent that it shall be possible to perform normal, abnormal and emergency operations appropriate to a helicopter as required for the training. Once activated, proper systems operation shall result from system management by the crewmember and not require any further input from the instructor's controls. 6. The instructor's station shall include: 7. A facility to enable the dynamic plotting of the flight path on approaches, commencing at the final approach fix, including the vertical profile; 8. Facilities to support the required training; 9. Adjustable cloud base and visibility shall be provided. 10. Control forces and control travels which respond in the same manner under the same flight conditions as in a helicopter. 11. Aerodynamic modelling shall reflect:	Credits as decided by DGCA in accordance with credits permitted by the regulatory authority to whose standards the FNPT was manufactured. In order to be used for helicopter type specific training,testing and checking the device shall also be qualified as a Flight Training Device or Flight Simulator.

	• Main and tail rotor characteristics; • The effects of icing on airframe and rotor; • Cross-coupling effects; • Changes of mass and center of gravity location and configuration; • Vortex ring. 12. Significant cockpit/flight deck and rotor sounds, responding to pilot actions, corresponding to the designated configuration of a helicopter. 13. A visual system (night/dusk and day) capable of providing a field-of-view of a minimum of 150 degrees horizontally from the middle eye point and 40 degrees vertically. The visual system shall be capable of meeting the standards laid down in Part 3 and 4 of AMC STD 3H.030 (Validation, Functions and Subjective Tests). The responses of the visual system and the cockpit/flight deck instruments to control inputs shall be closely coupled to provide the integration of the necessary cues. 14. A visual data base shall be provided sufficient to support the training requirements, including, where applicable: (i) Specific areas within the database need to have higher resolution to support landings, take-offs and ground cushion exercises and training away from a heliport. (ii) For cross-country flights sufficient scene details shall be provided to allow for ground to map navigation over a sector length equal to 30 minutes at an average cruise speed. (iii) For Offshore Airborne Radar Approaches, visual/ radar representations of installations shall be harmonised. (iv) For training in the use of Night Vision Goggles (NVG) the visual display shall have the ability to represent various scenes with the required levels of ambient light/colour.	
FNPT Type III	**As for Type II with the following additions or amendments:** 1. Local generic atmospheric models of wind pattern, such as around mountains and structures, as required to support the intended manoeuvres and procedures. 2. A visual system (night/dusk and day) capable of providing a field-of-view of a minimum of 150	Credits as decided by DGCA in accordance with credits permitted by the regulatory authority to whose standards the FNPT was manufactured.

	degrees horizontally from the middle eye point and 60 degrees vertically. 3. Detailed high resolution visual data bases as required to support at least the following manoeuvres and procedures: • Elevated heliports (including heli-decks) • Confined areas.	In order to be used for helicopter type specific training, testing and checking the device shall also be qualified as a Flight Training Device or Flight Simulator.

APPENDIX B

FLIGHT SIMULATION TRAINING DEVICE STANDARDS GENERAL

This appendix describes the minimum Full Flight Simulator (FFS), Flight Training Device (FTD) and Flight Navigation Procedures Trainer (FNPT) requirements for qualifying devices to the required Qualification Levels. Certain requirements included in this section shall be supported with a statement of compliance (SOC) and, in some designated cases, an objective test. The SOC will describe how the requirement was met. The test results shall show that the requirement has been attained. In the following tabular listing of FSTD standards, statements of compliance are indicated in the compliance column.

For FNPT use in Multi-Crew Co-operation (MCC) training the general technical requirement are expressed in the MCC column with additional systems, instrumentation and indicators as required for MCC training and operation.

For MCC (Multi Crew Co-operation) minimum technical requirements are as for Level II or III, with the following additions or amendments:

1.	Multi engine and multi pilot helicopter
2.	Performance reserves, in case of an engine failure, to be in accordance with CAT A criteria.
3.	Anti icing or de-icing systems
4.	Fire detection / suppression system
5.	Dual controls
6.	Autopilot with upper modes
7.	2 VHF transceivers
8.	2 VHF NAV receivers (VOR, ILS, DME)
9.	1 ADF receiver
10.	1 Marker receiver
11.	1 transponder
12.	Weather radar

FSTD STANDARDS

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
a. 1	A flight deck that is a full-scale replica of the helicopter simulated. Additional required crewmember duty stations and those required bulkheads aft of the pilot seats are also considered part of the cockpit and shall replicate the helicopter. A flight deck that replicates the helicopter.	X	X	X	X	X	X	X	X	X	X	X	
a. 2	The flight deck, including the instructor's station is fully enclosed. A flight deck, including the instructor's station that is sufficiently closed off to exclude distractions.	X	X	X	X	X	X	X	X	X	X	X	
b. 1	Full size panels with functional controls, switches, instruments and primary and secondary flight controls, which shall be operating in the correct direction and with the correct range of movement.	X	X	X	X	X	X	X	X	X			For FTD Level 1 as appropriate for the replicated system The use of electronically displayed images with physical overlay incorporating operable switches, knobs and buttons may be acceptable. This option is not acceptable for analogue instruments in FFS.

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
	Functional controls,switches, instruments and primary and secondary flight controls sufficient for the training events to be accomplished, shall be located in a spatially correct area of the flight deck.								X	X	X	X	The use of electronically displayed images with physical overlay incorporating operable switches, knobs and buttons is acceptable
c. 1	Lighting for panels and instruments shall be as per the helicopter. Lighting for panels and instruments shall be sufficient for the training events	X	X	X	X	X	X	X	X	X	X	X	
c. 2	Flight deck ambient lighting environment shall be dynamically consistent with the visual display and sufficient for the training event. The ambient lighting should provide an even level of illumination which is not distracting to the pilot.	X	X	X	X		X	X		X	X	X	
d. 1	Relevant flight deck circuit breakers shall be located as per the helicopter and shall function accurately when involved in operating procedures or malfunctions requiring or involving flight crew response.	X	X	X	X	X	X	X		X	X	X	

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
e.1	Effect of aerodynamic changes for various combinations of airspeed and power normally encountered in flight, including the effect of change in helicopter attitude, aerodynamic and propulsive forces and moments, altitude, temperature, mass, centre of gravity location and configuration.	X	X	X	X		X	X	X	X	X	X	Effects of Cg, mass and configuration changes are not required for FNPT LevelI.
	Aerodynamic and environment modelling shall be sufficient to permit accurate systems operation and indication.					X							
e.2	Aerodynamic modelling which includes ground effect, effects of airframe and rotor icing (if applicable), aerodynamic interference effects between the rotor wake and fuselage, influence of the rotor on control and stabilization systems, and representations of nonlinearities due to sideslip, vortex ring and retreating blade stall.			X	X		X	X		X	X	X	
f.1	Validation flight test data shall be used as the basis for flight and performance and systems characteristics.		X	X	X			X					

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
	Representative/generic aerodynamic data tailored to the helicopter with fidelity sufficient to meet the objective tests and sufficient to permit accurate system operation and indication.	X				X	X		X	X	X	X	Aerodynamic data need not be necessarily based on flight test data.
g. 1	All relevant flight deck instrument indications automatically respond to control movement by a crewmember, helicopter performance, or external simulated environmental effects upon the helicopter	X	X	X	X	X	X	X	X	X	X	X	
h. 1	All relevant communications, navigation, caution and warning equipment shall correspond to that installed in the helicopter. All simulated navigation aids within range shall be usable without restriction. Navigational data shall be capable of being updated.	X	X	X	X	X	X	X					
h. 2	Navigation equipment corresponding to that of a helicopter, with operation within the tolerances typically applied to the airborne equipment. This shall include communication equipment (interphone and air/ ground communications systems).								X	X	X	X	
h. 3	Navigational data with the corresponding approach facilities. Navigation aids	X	X	X	X	X	X	X	X	X	X	X	For FFSs and FTDs the navigation database should be updated

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
	should be usable within range without restriction												within 26 days. For FNPTs complete navigational data for at least 5 different European airports with corresponding precision and non-precesion approach procedures including current updating within a period of 3 months.
i.1	In addition to the flight crewmember stations, at least two suitable seats for the instructor and an additional observer shall be provided permitting adequate vision to the crewmembers' panel and forward windows. Observer seats need not represent those found in the helicopter but shall be adequately secured to the floor of the flight of sufficient integrity to safety restrain the occupant during any known or predicted motion system excursion.	X	X	X	X								The Authority will consider options to this standard based on unique cockpit configurations. Any additional seats installed shall be equipped with similar safety provisions.
i.2	Crewmember seats shall afford the capability for the occupants to be able to achieve the design eye reference position. In addition to the flight crewmember stations, at least two suitable seats for the instructor and an additional observer shall be provided permitting adequate vision to					X	X	X	X	X	X	X	The instructor's and observer's seats need not represent those found in the helicopter.

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
	the crewmembers' panel and forward windows.												
j.1	FFS systems shall simulate the applicable helicopter system operation, both on the ground and in flight. Systems shall be operative to the extent that normal, abnormal and emergency operating procedures appropriate to the simulator application can be accomplished. Once activated, proper system operation shall result from system management by the flight crew and not require input from instructor controls.	X	X	X	X								
j.2	FTD systems represented shall be fully operative to the extent that normal, abnormal and emergency operating procedures can be accomplished. Once activated, proper system operation shall result from system management by the flight crew and not require input from instructor controls.					X	X	X					
j.3	The systems should be operative to the extent that it should be possible to perform normal, abnormal, and emergency operations appropriate to a helicopter as required for training. Once activated, proper systems operations should result from								X	X	X	X	

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
	the system management by the crewmember and not require any further input from the instructor's controls.												
k. 1	The instructor shall be able to control system variables and insert abnormal or emergency conditions into the helicopter systems.Independent freeze and reset facilities shall be provided.	X	X	X	X	X	X	X	X	X	X	X	FNPT I: applicable only to enable the instructor to carry out selective failure ofbasic flight instruments and navigation equipment.
													For FNPT Level I : Ability to set the FNPT to minimum IMC speed or above
l.1	Control forces and control travel which correspond to that of the replicated helicopter. Control forces shall react in the same manner as in the helicopter under the same flight conditions.	X	X	X	X								For Level A only static control force characteristics need to be tested.
	Control forces and control travelshall be representative of the replicated helicopter under the same flight conditions as in the helicopter..					X	X	X					For FTD level 1 as appropriate for the system training required
	Control forces and control travel shall broadly correspond to that of a helicopter.								X				Only static control force characteristics need to be tested.
	Control forces and control travels shall respond in the same manner under the same flight conditions as in a helicopter.									X	X	X	Only static control force characteristics need to be tested.
i.2	Cockpit control dynamics, which replicate the helicopter			X	X		X	X					For helicopters with irreversible control

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
	simulated. Free response of the controls shall match that of the helicopter within the given tolerance. Initial and upgrade evaluation will include control free response (cyclic, collective, and pedal) measurements recorded at the controls. The measured responses shall correspond to those of the helicopter in ground operations, hover, climb, cruise, and auto-rotation.												systems, measurements may be obtained on the ground. Engineering validation or helicopter manufacturer rationale will be submitted as justification for ground test or to omit a configuration. For FFS requiring static and dynamic tests at the controls, special test fixtures will not be required during the initial evaluations if the FSTD operator's QTG shows both test fixture results and alternate test method results, such as computer data plots, which were obtained concurrently. Use of the alternate method during initial evaluation may then satisfy this test requirement. FTD Level 2 data can be representative / generic and need not necessarily be based on flight test data.

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
m.1	Ground handling and aerodynamic programming to include the following: Ground effect - hover and transition IGE. (Ground reaction - reaction of the helicopter upon contact with the landing surface during landing to include strut deflections, tire or skid friction, side forces, and other appropriate data, such as weight and speed, necessary to identify the flight condition and configuration. Ground handling characteristics -- control inputs to include braking, deceleration turning radius and the effects of crosswind.	X	X	X	X								Level A can utilise generic simulation of ground effect and ground handling.
	Ground handling and aerodynamic ground effects models should beprovided to enable lift-off, hover, and touchdown effects to be simulated and harmonized with the sound and visual system.						X	X					
	Generic ground handling and aerodynamic ground effects models should be provided to enable lift-off, hover, and touch down effects to be simulated and harmonized with the sound and visual system									X	X	X	
n. 1	Instructor controls for												
	(i) Wind speed and direction	X	X	X	X		X	X	X	X	X	X	
	(ii) Turbulence	X	X	X	X		X	X	X	X	X	X	

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
	(iii) Other atmospheric models to support the required training.				X			X			X	X	Examples: Generic atmospheric models of local wind patterns around mountains and structures.
	(iv) Adjustment of cloud base and visibility	X	X	X	X		X	X		X	X	X	
	(v) Temperature and barometric pressure.	X	X	X	X	X	X	X	X	X	X	X	
o.1	Representative stopping and directional control forces for at least the following landing surface conditions based on helicopter related data, for a running landing. (i) Dry (ii) Wet (soft surface and hard surface) (iii) Icy (iv) Patchy Wet (v) Patchy Icy			X	X								
p.1	Representative brake and tire failure dynamics.												
q.1	Cockpit control dynamics, which replicate the helicopter simulated. Free response of the controls shall match that of the helicopter within the given tolerance. Initial and upgrade evaluation will include control free response (cyclic, collective, and pedal) measurements recorded at the controls.The measured responses shall correspond to those of the helicopter in ground operations, hover, climb, cruise, and auto-rotatotion.		X	X	X		X	X		X	X	X	For helicopters with irreversible control systems, measurements may be obtained on the ground. Engineering validation or helicopter manufacturer rationale will be submitted as justification for ground test or to omit a configuration. For FFS requiring static and dynamic tests at the controls,

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1 General													
													special test fixtures will not be required during the initial evaluations if the FSTD perator's QTG shows both test fixture results and alternate test method results, such as computer data plots, which were obtained concurrently. Use of the alternate method during initial evaluation may then satisfy this test requirement. FTD Level 2 aerodynamic data can be representative / generic and need not necessarily be based on flight test data.
r.1	(1) Transport delay. Transport delay is the time between control input and the individual hardware (systems) responses.	X	X	X	X	X	X	X	X	X	X	X	For FSTD Level 1, only instrument response is required within a maximum permissible delay of 200 milliseconds.
	As an alternative, a Latency test may be used to demonstrate that the flight simulator system does not exceed the permissible delay.												For Level 'A' & 'B' FFS and Level 2 TD he maximum permissible delay is 150 milliseconds For Level 'C' & 'D' FFS and Level 3 FTD the maximum permissible delay is 100 milliseconds

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
	(2) Latency. Relative response of the visual system, cockpit instruments and initial motion system response shall be coupled closely to provide integrated sensory cues. These systems shall respond to abrupt pitch, roll, and yaw inputs at the pilot's position within the permissible delay, but not before the time, when the helicopter would respond under the same conditions. Visual scene changes from steady state disturbance shall occur within the system dynamic response limit but not before the resultant motion onset.	X	X	X	X	X	X	X					For FTD Level 1 and FNTP Level 1, only instrument response is required within a maximum permissible delay of 200 milliseconds. For Level 'A' & 'B' FFS Level 2 FTD and FNPT Level II and III the maximum permissible delay is 150 milliseconds For Level 'C' & 'D' FFS and Level 3 FTD the maximum permissible delay is 100 milliseconds
s. 1	A means for quickly and effectively testing FSTD programming and hardware. This may include an automated system, which could be used for conducting at least a portion of the tests in the QTG.	X	X				X				X	X	Recommendation for FTD Level 1, FNPT Level I and II. Automatic flagging of "out-tolerance' tests results is encouraged
	Self-testing for FSTD hardware and programming to determine compliance with the FSTD performance tests. Evidence of testing shall include FSTD number, date, time, conditions, tolerances, and the appropriate dependent variables portrayed in comparison with the helicopter standard			X	X			X					
t.1	A system allowing for timely continuous updating of FSTD	X	X	X	X	X	X	X					

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.1	General												
	hardware and programming consistent with helicopter modifications.												
u.1	The FSTD operator shall submit a Qualification Test Guide in a form and manner acceptable to the Authority. A recording system shall be provided that will enable the FSTD performance to be compared with QTG criteria.	X	X	X	X	X	X	X	X	X	X	X	
v.1	FSTD computer capacity, accuracy, resolution and dynamic response sufficient for the Qualification Level sought.	X	X	X	X	X	X	X	X	X	X	X	
w.1	Daily preflight documentation either in the daily log or in a location easily accessible for review.	X	X	X	X	X	X	X	X	X	X	X	

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.2 Motion System													
a. 1	Motion cues as perceived by the pilot shall be representative of the helicopter, e.g. touchdown cues should be a function of the simulated rate of descent.	X	X	X	X								Motion tests to demonstrate that each axes onset cues are properly phased with pilot input and helicopter response.
b. 1	A motion system:												The instructor's and observer's seats need not represent those found in the helicopter.
	Having a minimum of 3 degrees of freedom (pitch, roll, heave) to accomplish the required task.	X											
	6 degrees of freedom synergistic platform motion system		X	X	X								For level B, a reduced motion performance envelope is acceptable
c. 1	A means of recording the motion response time as required	X	X	X	X								
d. 1	Special effects programming to include the following:	X	X	X	X								For level A if may be of a generic nature sufficient to accomplish the required tasks.
	(1) Runway rumble, oleo deflections, effects of groundspeed and uneven surface characteristics.	X	X	X	X								
	(2) Buffet due to translational lift.	X	X	X	X								
	3) Buffet during extension and retraction of landing gear.	X	X	X	X								
	(4) Buffet due to high speed and retreating blade stall.	X	X	X	X								
	(5) Buffet due to vortex ring.	X	X	X	X								
	(6) Representative cues resulting from; (i) touchdown (ii) Translational lift.	X	X	X	X								

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.2 Motion System													
	(7) Antitorque device ineffectiveness	X	X	X	X								
	(8) Buffet due to turbulence.	X	X	X	X								
e.1	Characteristic vibrations /buffets that result from operation of the helicopter and which can be sensed in the cockpit. Simulated cockpit vibrations to include seat(s), flight controls and instrument panel(s), although these need not be tested independently.				X								Statement of Compliance required. Tests required with recorded results which allow the comparison of relative amplitudes versus frequency in the longitudinal, lateral and vertical axes with helicopter data.. Steady state tests are acceptable

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
a.1	Visual system capable of meeting all the standards of this paragraph and the respective paragraphs of validation tests as well as functions and subjective tests as applicable to the Level of Qualification	X	X	X	X		X	X		X	X	X	The choice of the display system and of the field of view requirements should fully consider the intended use of the FSTD. The balance between training and testing / checking may influence the choice and geometry of the display system. In addition the diverse operational requirements should be addressed.

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	requested by the FSTD operator.												
b.1	Visual system capable of providing at least a 45 degree horizontal and 30 degree vertical field of view simultaneously for each pilot.	X											
	Visual system capable of providing at least a 75 degrees horizontal and 40 degrees vertical field of view simultaneously for each pilot.		X										
	"Continuous", cross-cockpit, minimum visual field of view providing each pilot with 150 degrees horizontal and 40 degrees vertical.			X			X			X		X	A minimum of 75 degrees horizontal field of view on either side of the zero degree azimuth line relative to the helicopter fuselage is required.

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
b.2	"Continuous," cross-cockpit, minimum visual field of view providing each pilot with 150 degrees horizontal and 60 degrees vertical							X			X		A minimum of 75 degrees horizontal field of view on either side of the zero degree azimuth line relative to the helicopter fuselage is required. This will allow an offset per side of the horizontal field of view if required for the training.
													Where training tasks require extended field of view on either side of zero of zero degrees azimuth line relative to the helicopter fuselage is required. This will allow an offset per side of the horizontal field of view of required for the training.
b.3	"Continuous" cross cockpit, minimum visual field of view providing each pilot with180 degrees horizontal and 60 degrees				X								A minimum of 75 degrees of horizontal field of view on either side of zero degrees azimuth line relative to the helicopter fuselage is required. This will allow an offset per side of the horizontal field of view if required for the training. Where training tasks require extended field of view beyond the 180 degrees 60 degrees, then such extended fields of

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	vertical												view shall be provided.
c.1	A means of recording the visual response time for the visual system shall be provided.	X	X	X	X		X	X		X	X	X	
d.1	Visual cues to assess rate of change of height, translatio nal displace ments and rates, during takeoff and landing.	X	X										For Level 'A' Visual cueing sufficient to support changes in approach path by using FATO perspective
	Visual cues to assess rate of change of height, height AGL, translatio nal displace ments and rates, during take- off, low altitude/			X	X		X	X		X	X	X	

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	low airspeed manoeuvring, hover, and landing.												
e.1	Test procedures to quickly confirm visual system colour, RVR, focus, intensity, level horizon, and attitude as compared with the specified parameters.	X	X	X	X		X	X		X	X	X	Statement of compliance required. Test required.
f.1	A minimum of 10 levels of occulting. This capability should be demonstrated by a visual model through each channel.			X	X		X	X		X	X	X	Statement of compliance required. Test required.

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
g.1	Surface (Vernier) resolution shall be demonstrated by a test pattern of objects shown to occupy a visual angle of not greater than 3 arc minutes in the visual display used on a scene from the pilot's eye point..			X	X		X	X		X	X	X	Statement of compliance required. Test required.
h.1	Lightpoint size shall not be greater than 6 arc minutes			X	X								This is equivalent a light point resolution of 3 arc minutes.
	Lightpoint size shall not be greater than 8 arc minutes		X				X	X		X	X	X	This is equivalent a light point resolution of 4 arc minutes.
i.1	Daylight, dusk, and night visual scenes with			X	X		X	X		X	X	X	

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	sufficient scene content to recognise aerodromes, heliports, terrain, and major landmarks around the Final Approach and Take-off (FATO) area and to successfully accomplish low airspeed/low altitude manoeuvres to include lift-off, hover, translational lift, landing and touchdown.												
j.1	A visual database sufficient to support the requirements,		X	X	X		X	X		X	X	X	Generic database is acceptable only for FTDs and FNPTs.

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	including												
	Specific areas within the database needing higher resolution to support landings, take-offs and ground cushion exercises and training away from a heliport. Including elevated helipad, helidecks and confined areas		X	X	X		X	X		X	X	X	
	For cross-country flights sufficient scene details to allow for ground to map navigation over a sector length equal to 30 minutes		X	X	X		X	X		X	X	X	Where applicable

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	at an average cruise speed.												
	(i) For offshore airborne radar approaches (ARA), harmonized visual/radar representations of installations.		X	X	X		X	X		X	X	X	Where applicable
	(ii) (For training in the use of Night Vision Goggles (NVG) a visual display with the ability to		X	X	X		X	X		X	X	X	Where applicable

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	represent various scenes with the required levels of ambient light/colour.												
k.1	Daylight, twilight (dusk/dawn) and night visual capability for system brightness and contrast ratio criteria as applicable for level of qualification sought.			X	X		X	X		X	X	X	The ambient lighting should provide an even level of illumination, which is not distracting to the pilot.
k.2	Night and Dusk scene	X	X										

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	The visual system should be capable of producing Full colour presentations.			X	X		X	X		X	X	X	
k.3	Full colour texture shall be used to enhance visual cue perception for illuminated landing surfaces.												Statement of Compliance required
	The visual system should be capable of producing, as a minimum:												Test required

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	1) A scene content comparable in detail with that produced by 6,000 polygons for daylight and 1000 visible light points for night and dusk scenes for the entire visual system.						X	X		X	X	X	Freedom of apparent quantization and other distracting visual effects are also applicable for Levels A and B.

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	2) A scene content comparable in detail with that produced by 4,000 polygons for daylight and 5000 visible light points for night and dusk scenes for the entire visual system			X									

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	3) A scene content comparable in detail with that produced by 6,000 polygons for daylight and 7000 visible light points for night and dusk scenes for the entire visual system.				X								
I.1	Surface contrast ratio:												
	Demonstration model												
	Not less than 5:1			X	X								
	Not less than 8:1						X	X					
I.2	Light Contrast ratio												
	Not less than 25:1			X	X		X	X					
m.1	Highlight												

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	Brightness. The minimum light measured at the pilot's eye position should be:												
	14 cd/m^2 (4 ft-Lamberts)			X									
	17 cd/m^2 (5 ft-Lamberts)						X	X		X	X	X	
	20 cd/m^2 (6 ft-Lamberts)				X								
1.4 Sound Systems													
a.1	Significant flight deck sounds, and those, which result from pilot actions corresponding to those of the helicopter shall be provided.	X	X	X	X	X	X	X		X	X	X	For FTD level 1 as appropriate for the system training required.

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
a.2	Sounds due to engines,transmission and rotors should be available.							X					Statement of Compliance required for FFS.
b.1	Sound of precipitation, windshield wipers, the sound resulting from a blade strike and a crash condition when operating the helicopter in excess of limitations.			X	X		X	X					Crash sounds may be generic Statement of Compliance or Demonstration of representative sounds required.
c.1	Realistic amplitude and frequency of cockpit acoustic environment.				X								Objective steady-state tests required.
d.1	The	X	X	X	X								

FSTD STANDARDS		FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
		A	B	C	D	1	2	3	I	II	III	MCC	
1.3 Visual System													
	volume control shall have an indication of sound level setting which meets all qualification requirements.												

Appendix C

VALIDATION TESTS AND OBJECTIVE TESTS

FSTD Validation Tests

1 **General**

1.1 FSTD performance and system operation should be objectively evaluated by comparing the results of tests conducted in the FSTD with helicopter data unless specifically noted otherwise. To facilitate the validation of the FSTD, an appropriate recording device acceptable to the Authority should be used to record each validation test result. These recordings should then be compared to the approved validation data.

1.2 Certain tests in this CAR are not necessarily based upon validation data with specific tolerances.

However, these tests are included here for completeness, and the required criteria should be fulfilled instead of meeting a specific tolerance.

1.3 The FSTD MQTG should describe clearly and distinctly how the FSTD will be set up and operated for each test. Use of a driver programme designed to accomplish the tests automatically is encouraged. Overall integrated testing of the FSTD should be accomplished to assure that the total FSTD system meets the prescribed standards.

Historically, the tests provided in the QTG to support FSTD qualification have become increasingly fragmented. During the development of the ICAO Manual of Criteria for the Qualification of Flight Simulators, 1993 by a RAeS Working Group, the following text was inserted:

"It is not the intent, nor is it acceptable, to test each Flight Simulator subsystem independently. Overall Integrated Testing of the Flight Simulator should be accomplished to assure that the total Flight Simulator system meets the prescribed standards."

This text was developed to ensure that the overall testing philosophy within a QTG fulfilled the original intent of validating the FSTD as a whole whether the testing was carried out automatically or manually.

To ensure compliance with this intent, QTGs should contain explanatory material which clearly indicates how each test (or group of tests) is constructed and how the automatic test system is controlling the test e.g. which parameters are driven, free, locked and the use of closed and open loop drivers.

A test procedure with explicit and detailed steps for completion of each test must also be provided. Such information should greatly assist with the review of a QTG which involves an understanding of how each test was constructed in addition to the

checking of the actual results. A manual test procedure with explicit and detailed steps for completion of each test should also be provided.

1.4 Submittals for approval of data other than flight test should include an explanation of validity with respect to available flight test information. Tests and tolerances in this paragraph should be included in the FSTD MQTG.

1.5 The table of FSTD Validation Tests in this CAR indicates the test requirements. Unless noted otherwise, FSTD tests should represent helicopter performance and handling qualities at operating weights and centres of gravity (cg) positions typical of normal operation.

For FFS devices, if a test is supported by helicopter data at one extreme weight or cg, another test supported by helicopter data at mid-conditions or as close as possible to the other extreme should be included. Certain tests which are relevant only at one extreme weight or cg condition need not be repeated at the other extreme. Tests of handling qualities should include validation of augmentation devices.

1.6 For the testing of Computer Controlled Helicopter (CCH) FSTDs, flight test data are required for both the normal (N) and non-normal (NN) control states, as applicable to the helicopter simulated and, as indicated in the validation requirements of this paragraph. Tests in the non-normal state should always include the least augmented state. Tests for other levels of control state degradation may be required as detailed by the Authority at the time of definition of a set of specific helicopter tests for FSTD data. Where applicable, flight test data should record:

a. pilot controller deflections or electronically generated inputs including location of input; and
b. rotor blade pitch position or equivalent

1.7 Where extra equipment is fitted, such as a motion system or in an FTD Level 1 or FNPT Level I, a visual system, such equipment is expected to satisfy, as a minimum, tests as follows:

a. Visual system: where fitted to an FNPT Level I or FTD Level 1, validation tests are those specified for a FNPT Level II or for a FTD Level 2 respectively.
b. Motion system: where fitted to an FTD or FNPT, validation tests are those specified for a Level A FFS.

2 Test requirements

2.1 The ground and flight tests required for qualification are listed in the table of FSTD Validation Tests. Computer generated FSTD test results should be provided for each test. The results should be produced on an appropriate recording device acceptable to the Authority. Time histories are required unless otherwise indicated in

the table of validation tests.

2.2 Approved validation data which exhibit rapid variations of the measured parameters may require engineering judgement when making assessments of FSTD validity. Such judgement should not be limited to a single parameter. All relevant parameters related to a given manoeuvre or flight condition should be provided to allow overall interpretation. When it is difficult or impossible to match FSTD to helicopter data or approved validation data throughout a time history, differences should be justified by providing a comparison of other related variables for the condition being assessed. Tolerances should be only applied in the validity domain of the parameter sensors.

2.2.1 Parameters, tolerances, and flight conditions.

a. The table of FSTD validation tests in paragraph 2.3 below describes the parameters, tolerances, and flight conditions for FSTD validation. When two tolerance values are given for a parameter, the less restrictive may be used unless indicated otherwise. Where tolerances are expressed as a percentage:

b. for parameters that have units of percent, or parameters normally displayed in the cockpit in units of percent (e.g. N1, N2, engine torque or power), then a percentage tolerance will be interpreted as an absolute tolerance unless otherwise specified (i.e. for an observation of 50% N1 and a tolerance of 5%, the acceptable range shall be from 45% to 55%).

c. for parameters not displayed in units of percent, a tolerance expressed only as a percentage will be interpreted as the percentage of the current reference value of that parameter during the test, except for parameters varying around a zero value for which a minimum absolute value should be agreed with the Authority.

d. If a flight condition or operating condition is shown which does not apply to the qualification level sought, it should be disregarded. FSTD results should be labelled using the tolerances and units specified.

2.2.2 Flight condition verification. When comparing the parameters listed to those of the helicopter, sufficient data should also be provided to verify the correct flight condition. All airspeed values should be clearly annotated as to indicated, calibrated, true airspeed, etc… and like values used for comparison.

2.2.3 Where the tolerances have been replaced by 'Correct Trend and Magnitude' (CT&M), the FSTD should be tested and assessed as representative of the helicopter to the satisfaction of the Authority. To facilitate future evaluations, sufficient parameters should be recorded to establish a reference. For the initial qualification of FNPTs no tolerances are to be applied and the use of CT&M is to be assumed throughout.

2.2.4 For the conditions where the design of the flight controls system does not imply any difference on the rotor blade pitch positions between augmented case and unaugmented case, unaugmented case validation data are not required for the unaugmented case. A rationale is to be provided to identify which tests are not performed.

2. 3 Table of FSTD Validation Tests

2.3.1 A number of tests within the QTG have had their requirements reduced to 'Correct Trend and Magnitude' (CT&M) for initial evaluations thereby avoiding the need for specific Flight Test Data. Where CT&M is used it is strongly recommended that an automatic recording system be used to
'footprint' the baseline results thereby avoiding the effects of possible divergent subjective opinions on recurrent evaluation.

However, the use of CT&M is not to be taken as an indication that certain areas of simulation can be ignored. It is imperative that the specific characteristics are present, and incorrect effects would be unacceptable.

2.3.2 In all cases the tests are intended for use in recurrent evaluations at least to ensure repeatability.

TABLE OF FSTD VALIDATION TESTS

(Note : CT &M stands for " Correct trend and magnitude")

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
PERFORMANCE														
a) **Engine Assessment**														
(1) Start Operations	Light Off Time ± 10% or ± 1 sec	Ground Rotor Brake used / Not used	CT&M	X	X	X	CT&M	X	X		X	X	X	Time histories of each engine from initiation of start sequence to steady state idle and from steady state idle to operating RPM
(i) Engine Start and acceleration (transient)	Torque ±5% Rotor Speed:± 3% Fuel Flow: ±10% Gas Generator Speed ±5% Power Turbine Speed ±5% Turbine Gas Temp. ± 30°C		CT&M	X	X	X	CT&M	X	X		X	X	X	Tolerance to be only applied in the validity domain of the engine parameter sensors
(ii) Steady State Idle and Operating RPM Conditions	Torque ±3% Rotor Speed ±1.5% Fuel Flow ±5% Gas Generator Speed ±2% Power Turbine Speed ±2% Turbine Gas Temp. ± 20°C	Ground	CT&M	X	X	X	CT&M	X	X		X	X	X	Present data for both steady state idle and operating RPM conditions. May be a snapshot tests.
(2) Power Turbine Speed Trim	± 10% of total change of power turbine speed or ± 0.5% rotor speed	Ground	CT&M	X	X	X	CT&M	X	X		X	X	X	Time history of engine response to trim system actuation (both directions)
(3) Engine & Rotor Speed Governing	Torque ± 5% Rotor Speed ±1.5%	Climb / Descent	CT&M	X	X	X	CT&M	X	X		X	X	X	Collective step inputs. Can be conducted with climb & descent performance tests.
b) **Ground Operations**														
(1) Minimum Radius Turn	Helicopter turn radius ±	Ground		X	X	X								If differential braking is used, brake force

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	3ft (0.Xm) or 20%													shall be set at the helicopter test flight value.
(2) Rate of Turn vs Pedal Deflection or nosewheel angle	Turn rate ± 10% or 2° / sec	Ground		X	X	X								Without use of wheel brake
(3) Taxi	Pitch attitude ± 1.5° Torque ± 3% Longitudinal Control Position ± 5% Lateral Control Position ± 5% Directional Control Position ± 5% Collective Control Position ± 5%	Ground	C T & M	X	X	X								Control Position & Pitch Attitude during ground taxi for a specific ground speed & direction, and density altitude
(4) Brake Effectiveness	Time : ± 10% or ± 1s and Distance : ± 10% or ± 30m (100ft)	Ground	C T & M	X	X	X	C T & M	C T & M	C T & M					Record data Until full stop
c) **Take-off**														
(1) All engines	Airspeed ±3 kt Altitude ±20 ft (6.1 m) Torque ±3% Rotor Speed ±1.5% Pitch Attitude ±1.5° Bank Attitude ±2° Heading ± 2° Longitudinal Control Position ± 10% Lateral Control Position ± 10%	Ground/lift off and initial climb	C T & M	X	X	X	C T & M	X	X		X	X	X	Time history of takeoff flight path as appropriate to helicopter model simulated [running take off for FFS Level B & FTD Level 2. Takeoff from a hover for FS Level C & D or FTD Level 3]. For FFS Level B and FTD Level 2, criteria apply only to those segments at airspeeds above effective

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	Directional Control Position ± 10% Collective Control Position ± 10%													translational lift. Record data to at least 200 ft (61 meters)AGL/Vy whichever comes later
(2) One Engine Inoperative continued takeoff	See 1.c.(1) above for tolerances and flight conditions	Takeoff & initial climb	CT&M	X	X	X	CT&M	X	X		X	X	X	Time history of takeoff flight path as appropriate to helicopter model simulated. Record data to at least 200 ft (61 meters) AGL/ Vy whichever comes later
(3) One Engine inoperative rejected take off	Airspeed ±3 kt Altitude ± 20 ft (6.1m) Torque ±3% Rotor Speed: ±1.5% Pitch Attitude ±1.5° Bank Attitude±1.5° Heading ±2° Longitudinal Control Position ± 10% LateralControl Position ± 10% Directional Control Position ± 10% Collective Control Position ± 10% Distance: ± 7.5% or ± 30m (100ft)	Ground/Takeoff	CT&M	CT&M	X	X		X	X			X	X	Time history from the take off point to touch down. Test conditions near limiting performance
d) **Hover Performance**														

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	Torque ±3% Pitch Attitude Position ± 5% LateralControl Position ± 5% Directional Control Position ± 5% Collective Control Position ± 5%	In Ground Effect (IGE) Out of Ground Effect (OGE) Stability augmentation on and off	CT&M	X	X	X	CT&M	X	X		X	X	X	Light/heavy gross weights. May be snapshot tests.
e) **Vertical Climb Performance**														
	Vertical Velocity ± 100 fpm(0.50m/sec) or 10% Directional Control Position ± 5% Collective Control Position ± 5%	From OGE Hover Stability augmentation on and off	CT&M	X	X	X	CT&M	X	X		X	X	X	Light/heavy gross weights. May be snapshot tests.
f) **Level Flight Performance and Trimmed Flight Control Position**														
	Torque ±3% Pitch Attitude: ± 1.5° Sideslip Angle ±2° Longitudinal Control Position ± 5% LateralControl Position ± 5% Directional Control Position ± 5% Collective Control	Cruise Stability Stability augmentation on or off	CT&M	X	X	X	CT&M	X	X	X	X	X	X	Two combinations of gross weight / cg and two speeds within the flight envelope. May be snapshot tests. For FNPT Level 1 changes in Cg are not required

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	Position ±5%													
g) **Climb Performance and Trimmed Flight Control Position**														
	VerticalVelocity ± 100 fpm (0.50 m /sec) or 10% Pitch Attitude ±1.5° Sideslip Angle ±2° Longitudinal Control Position ±5% Lateral Control Position ±5% Directional Control Position ±5% Collective Control Position ±5% Speed ±3kts	All engines operating One engine inoperative Stability augmentation on or off	C T & M	X	X	X	C T & M	X	X	X	X	X	X	Two gross weight/cg combinations. Data presented at relevant climb power conditions. The achieved measured vertical velocity of the FSTD cannot be less than the appropriate Approved Flight Manual values. For FNPT Level 1 changes in Cg are not required. May be snapshot tests.
h) **Descent**														
(1) Descent Performance and trimmed Flight Control Position	Torque ±3% Pitch Attitude Lateral Control Position ± 5% Directional Control Position ± 5% Collective Control Position ± 5%	At or near 1000 fpm (5m/sec) Rate of Descent (RoD) at normal approach speed. Stability augmentation on or off	C T & M	X	X	X	C T & M	X	X	X	X	X	X	Two gross weight/ CG combinations For FNPT Level 1 changes in Cg are not required. May be snapshot tests
(2) Autorotation Performance and trimmed Flight Control Position	Vertical Velocity ± 100fpm (0.50 m/sec) or 10% Rotor Speed Lateral Control Position ± 5% Directional Control	Steady descents Stability augmentation on or off	C T & M	X	X	X	C T & M	X	X	X	X	X	X	Two gross weight/CG combinations. Rotor speed tolerance only applies if collective control position is fully down. Speed sweep from approximately 50 kt

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	Position ±5% Collective Control Position ±5%													to at least maximum glide distance airspeed. May be a series of snapshot tests
i) **Autorotational Entry**														
	Torque ±3% Rotor speed Airspeed ±5 kt Altitude ± 20ft (6.1m)	Cruise or climb	C T & M	X	X	X		X	X	X	X	X	X	Time history of vehicle response to a rapid power reduction to idle. If cruise, data should be presented for the maximum range airspeed. If climb, data should be presented for the maximum rate of climb airspeed at or near maximum continuous power.
j) Landing														
(1)All engines	Airspeed ±3 kt Altitude ±20 ft (6.1m) Torque ± 3% Rotor Speed Pitch Attitude Lateral Control Position ± 10% Directional Control Position ± 10% Collective Control Position ± 10%	Approach and landing	C T & M	X	X	X	C T & M	X	X	C T & M	X	X	X	Time history of approach and landing profile as appropriate to helicopter model simulated (running landing for FFS Level B / FTD Level 2, approach to a hover and to touchdown for FFS Level C & D / FTD Level 3). For FFS levels A & B, and FTD Levels 1 and 2, & FNPT Level II and IIIcriteria apply only to those segments at airspeeds above effective translational lift.
(2) One Engine Inoperative	See 1j(1) above for tolerances	Approach and landing	C T & M	X	X	X	C T & M	X	X		X	X	X	Include data for both Category A & Category B Approaches & landings as appropriate to the helicopter model being simulated.

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
														For FFS levels A & B, and FTD Levels 1 and 2, and FNPT Level II and III criteria apply to only those segments at airspeeds above effective translational lift
(3) Balked Landing/ missed approach	See 1j(1) above for tolerances	Approach, one engine inoperative		X	X	X		X	X		X	X	X	From a stabilized approach at the landing decision point (LDP)
(4) Auto-rotational Landing with Touchdown	Airspeed ± 3kts Torque ±3% Rotor Speed ±3% Altitude ± 20ft (6.1m) Pitch Attitude ± Bank Attitude ± Heading ±5° Longitudinal Control Position ± 10% Lateral Control Position ± 10% Directional Control Position ± 10% Collective Control Position ± 10%	Approach and Touchdown			X	X		C T & M	C T & M					Time history of autorotational deceleration and touchdown from a stabilized auto-rotational descent.
2. **HANDLING QUALITIES**														
a. Control System Mechanical Characteristics														
1) Cyclic	Breakout ± 0.25 lb (0.112 daN) or 25% Force ±0.5 lb (0.224 daN) or 10%	Ground, Static Trim On and Off	X	X	X	X	C T & M	X	X	X	X	X	X	Uninterrupted control sweeps. This test is not required for aircraft hardware modular controllers. Cyclic position vs. force shall be measured at

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
		Friction Off Stability augmentation on and off												the control. An alternate method acceptable to the Authority in lieu of the test fixture at the controls would be to instrument the FSTD in an equivalent manner to the flight test helicopter. The force position data from instrumentation can be directly recorded and matched to the helicopter data. Such a permanent installation could be used without requiring any time for installation of external devices.
2) Collective/ Pedals	Breakout ± 0.5 lb (0.224 daN) or 10% Force ± 1.0 lb (0.448 daN) or 10%	Ground, Static Trim On/Off Friction Off Stability augmentation on/off	X	X	X	X	CT&M	X	X	X	X	X	X	Uninterrupted control sweeps. This test is not required for aircraft hardware modular controllers. Collective and pedal position vs. force shall be measured at the control. An alternate method acceptable to the Authority in lieu of the test fixture at the controls would be to instrument the FSTD in an equivalent manner to the flight test helicopter. The force position data from instrumentation can be directly recorded and matched to the helicopter data. Such a permanent installation could be used without

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
														requiring any time for installation of external devices.
3) Brake Pedal Force vs position	±5 lb (2.224 daN) or 10%	Ground, Static	C T & M	X	X	X	C T & M	X	X					Simulator computer output results may be used to show compliance
4) Trim System Rate (all applicable axes)	Rate ±10%	Ground, Static Trim on Friction off	X	X	X	X	C T & M	X	X	X	X	X	X	Tolerance applies to recorded value of trim rate
5) Control Dynamics (all axes)	±10% of time for first zero crossing and ±10 (N+1)% of period thereafter ± 10% amplitude of first overshoot ±20% of amplitude of 2nd and subsequent overshoots greater than 5% of initial displacement ±1 overshoot	Hover and Cruise Trim on Friction off Stability augmentation on and off		X	X	X	C T & M	X						Control dynamics for irreversible control systems may be evaluated in a ground/static condition. Data should be for a normal control displacement in both directions in each axis (approximately 25% to 50% of full throw). N is the sequential period of a full cycle of oscillation.
6) Free play	±0.10 in (2.5mm)	Ground, Static Friction Off		X	X	X		X	X					Applies to all controls.
b. Low Airspeed Handling Qualities														
(1) Trimmed Flight Control Positions	Torque ±3% Pitch Attitude ±1.5° Bank Attitude ±2° Longitudinal Control Position ±5% Lateral Control	Translational Flight IGE. Sideways, rearward and forward Stability augmentation on or off			X	X		X	X					Several airspeed increments to translational airspeed limits and 45 kt forward. Maybe a series of snapshot tests.

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	Position ±5% Directional Control Position ±5% Collective Control Position ±5%													
(2) Critical Azimuth	Torque ±3% Pitch Attitude± 1.5° Bank Attitude±2° Longitudinal Control Postion ±5% Lateral Control Position ±5% Direction Control Position ±5% Collective Control Position ±5%	Hover Stability augmentation on or off			X	X		X	X					Present data for three relative wind directions (including the most critical case) in the critical quadrant. May be a snapshot test. Precise wind measurement is very difficult and simulated wind obtained by translation flight in calm weather condition (no wind) is preferred in order to control precisely flight conditions by using groundspeed measurement (usually GPS). In this condition, it would be more practical to realize this test with tests 2b (1) in order to ensure consistency between critical azimuth and other directions (forward, sideward and rearward)
(3) Control Response														
(i) Longitudinal	Pitch Rate ±10% or ± 2°/sec Pitch Attitude Change ±10% or ±	Hover Stability augmentation on and off			X	X		C T & M	X					Step control input. Off axis response must show correct trend for unaugmented cases.

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	1.5°													
(ii) Lateral	Roll Rate ± 10% or ± 3°/sec Roll Attitude Change ± 10% or ± 3°	Hover Stability augmentation on and off			X	X		CT&M	X					Step control input. Off axis response must show correct trend for unaugmented cases.
(iii) Directional	Yaw Rate ± 10% or ± 2°/sec Heading Change ± 10% or ± 2°	Hover Stability augmentation on and off			X	X		CT&M	X					Step control input. Off axis response must show correct trend for unaugmented cases.
(iv) Vertical	Normal Acceleration ± 0.1g	Hover Stability augmentation on and off			X	X		CT&M	X					Step control input. Off axis response must show correct trend for unaugmented cases.
c. Longitudinal Handling Qualities														
(1) Control Response	Pitch Rate Or ±2°/sec Pitch Attitude Change ±10% or ± 1.5°	Cruise Stability augmentation on and off		X	X	X		CT&M	X					Two cruise airspeeds to include minimum power required speed. Step control input. Off axis response must show correct trend for unaugmented cases
(2) Static Stability	Longitudinal Control Position ±10% or change from trim or ± 0.25 in (6.3 mm) or Longitudinal Control Force ± 0.5 lb (0.224 daN) or ± 10%	Cruise or Climb and Autorotation Stability augmentation on or off	X	X	X	X	CT&M	X	X					Minimum of two speeds on each side of the trim speed. May be a series of snapshot tests.
3) Dynamic Stability														
(i) Long Term Response	±10% of Calculated Period ±10% of Time to 1/2 or	Cruise Stability augmentation off		X	X	X		CT&M	X		X	X	X	Test should include three full cycles (6 overshoots after input completed) or that sufficient to determine time to ½ or double amplitude,

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	Double Amplitude or ±0.02 of Damping Ratio													whichever is less. For non- periodic response the time history should be matched.
(ii) Short Term Response	±1.5° Pitch attitude or ±2°/sec Pitch Rate ±0.1 g Normal Acceleration	Cruise or Climb Stability augmentation on and off		X	X	X		C T & M	X		X	X	X	Two airspeeds. Time history to validate short helicopter response due to control pulse input. Check to stop 4 seconds after completion of input.
(4) Manoeuvring Stability	Longitudinal Control Position ± 10% of change from trim or ± 0.25 in (6.3 mm) or Longitudinal Control Force ±0.5 lb (0.224 daN) or ± 10%	Cruise or Climb Stability augmentation on or off Left and right turns	C T & M	X	X	X	C T & M	X	X					Force may be a cross plot for irreversible systems. Two airspeeds. May be a series of snapshot tests. Approximately 30° and 45° bank attitude data should be presented.
(5) Landing Gear Operating Time	±1 sec	Takeoff (Retraction) Approach (Extension)	X	X	X	X	X	X	X	X	X	X	X	
d. Lateral & Directional Handling Qualities.														
(1) Control Response (i) Lateral (ii) Directional	Roll Rate ± 10% or ± 3°/sec Roll Attitude Change ± 10% or ±3° Yaw rate ± 10% or 2^0 /sec. Yaw Attitude Change ± 10% or ± 2^0	Cruise Stability augmentation on and off Cruise Stability augmentation on and off		X X	X X	X X	C T & M C T & M		X X	X X	X X	X X	X X	Two airspeeds to include one at or near the minimum power required speed. Step control input. Off axis response must show correct trend for unaugmented cases. Two airspeeds to include one at or near the minimum power required speed. Step control input. Off axis response must show

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
														correct trend for unaugmented cases.
(2) Directional Static Stability	Lateral Control Position ± 10% of change from trim or ± 0.25in (6.3 mm) , or , Lateral Control Force ±0.5 lb (0.224 daN) or ±10% Roll Attitude ±1.5° Directional Control Position ± 10% of change from trim or ± 0.25 in (6.3 mm) or Directional Control Force ±1 lb (0.448 daN) or ± 10% Longitudinal Control Position ±10% of change from trim or ± .25in (6.3mm)	Cruise or (Climb and Descent) Stability augmentation on or off	C T & M	X	X	X	C T & M	X	X					Steady heading sideslip. Minimum of two sideslip angles on either side of the trim point. Force may be a cross plot for irreversible control systems. May be a snapshot test.
(3) Dynamic Lateral and Directional Stability														
(i) Lateral – Directional Oscillations	±0.5 sec or ± 10% of Period ±10% of Time to ½ or Double Amplitude or ± .02 of Damping Ratio ±20% or ±1 sec of Time Difference between peaks of	Cruise or Climb Stability augmentation on and off	C T & M	X	X	X	C T & M	C T & M	X		X	X	X	Two airspeeds. Excite with cyclic or pedal doublet. Test should include six full cycles (12 overshoots after input completed) or that sufficient to determine time to ½ or double amplitude, whichever is less. For non-periodic response, time history should be matched.

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	peaks of Bank and Sideslip													
(ii) Spiral Stability	Correct trend on Bank - ±2° or ±10% in 20 sec	Cruise or Climb Stability augmentation on and off	CT&M	X	X	X	CT&M	CT&M	X		X	X	X	Time history of release from pedal only or cyclic only turns in both directions. Terminate check at zero bank or unsafe attitude for divergent cases.
(iii) Adverse / Proverse Yaw	Correct trend on side slip ±2°	Cruise or Climb Stability augmentation on and off	CT&M	x	x	x		CT&M	X					Time history of initial entry into cyclic only turns in both directions. Use moderate cyclic input rate.
3. ATMOSPHERIC MODELS														
(1) A test to demonstrate turbulence models	N/A	Take-off, Cruise and Landing	X	X	X	X		X	X	X	X	X	X	
(2) Tests to demonstrate other atmospheric models to support the required training						X			X			X	X	
4. MOTION SYSTEM****														
a. Motion Envelope														
(1) Pitch		N/A												
(i) Displacement														
± 200			X	X										
± 250/					X	X								
(ii) Velocity														
± 15^0/sec			X	X										
±20^o/sec					X	X								
(iii) Acceleration														
± 750/sec			X	X										
±100o/sec					X	X								
(2) Roll		N/A												
(iv) Displacement														
± 200			X	X										
± 250/					X	X								
(i) Velocity														

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
± 150/sec			X	X										
±20o/sec					X	X								
(iii) Acceleration														
± 750/sec			X	X										
±100o/sec					X	X								
(3) Yaw		N/A												
(i)Displacement														
± $25^{0/}$				X	X	X								
(ii) Velocity														
± 15^{0}/sec				X										
±20^{O}/sec					X	X								
(iii) Acceleration														
± 750/sec				X	X	X								
±100o/sec														
(4) Vertical		N/A												
(i) Displacement														
± 22 in			X	X										
± 34 in					X	X								
(ii) Velocity														
± 16 in/sec			X	X										
+ 24 in / sec					X	X								
(iii) Acceleration														
± 0.6g			X	X										
±0.8g					X	X								
(5) Lateral		N/A												
(i) Displacement														
± 26 in				X										
± 45 in					X	X								
(ii) Velocity														
± 20 in/sec				X										
± 28 in / sec					X	X								
(iii) Acceleration														
± 0.4g				X										
±0.6g					X	X								
(6) Longitudinal		N/A												
(i) Displacement														
± 27 in				X										
± 34 in					X	X								
(ii) Velocity														
± 20 in/sec				X										
± 28 in / sec					X	X								
(iii) Acceleration														
± 0.4g				X										
±0.6g					X	X								
(7) Initial		N/A												All relevant rotational

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
Rotational														axes
Acceleration Rate														
All Axes ±			X	X										
225°/sec2/sec														
300°/sec2/sec					X	X								
(8) Initial Linear														
Acceleration Rate														
(i) Vertical														
± 4g			X	X										
±6g					X	X								
(ii) Lateral														
± 2g				X										
±3g					X	X								
(iii) Longitudinal														
± 2g				X										
±3g					X	X								
b. Frequency Response Band, Hz	Phase Amplitude Deg Ratio Db	N/A		X	X	X								All six axis
0.1 to- 1.0 1.1 to 3.0	0 to -20 ± 2 0 to -40 ± 4													
c. Leg Balance or Parasitic Acceleration	1.5 deg 0.02g or 3deg/sec² (peak)	N/A		X	X	X								The phase shift between a datum jack & any other jack shall be measured using a heave (vertical) signal of 0.5hz at ± 0.25g The acceleration in the other five axes should be measured using a heave (vertical) signal of 0.5hz at ±0.1g
d. Turn Around	0.05g			X	X	X								The motion base shall be driven sinusoidally in heave through a displacement of 6 in (150 mm) peak to peak at a frequency of 0.5Hz. Deviation from the desired sinusoidal acceleration shall

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
														be measured
e. Characteristic vibrations/buffet (1) Vibration-Tests to include1/Rev and n/Rev vibrations where n is the number of rotor blades	+3 / -6db or ± 10% of nominal vibration level in flight cruise & correct trend (see comment)	On ground (idle Flt Nr); Low & High speed transition to & from hover; Level flight; Climb/descent (including vertical climb; Auto-rotation; Steady Turns				X								Correct trend refers to a comparison of vibration amplitudes between different manoeuvres. E.g. If the 1/rev vibration amplitude in the helicopter is higher during steady state turns than in level flight this increasing trend shall be demonstrated in the simulator.
(2) Buffet A test with recorded results is required for characteristic buffet motion which can be sensed in the cockpit	+3 / -6db or ± 10% of nominal vibration level in flight cruise & correct trend (see comment)	On ground and in flight				X								The recorded test results for characteristic buffets should allow the checking of relative amplitude for different frequencies. For atmospheric disturbance, general purpose models are acceptable which approximate demonstrable flight test data
f. Motion Cue Repeatability	N/A			X	X	X								
5. VISUAL SYSTEM (Note: Refer to the table of functions & subjective tests for additional visual tests)														
a. Visual Ground Segment (VGS)	Near end. The lights computed to be visible should be visible in the FSTD. Far end : ± 20% of the computed VGS	Trimmed in the landing configuration at 30 m (100 ft) wheel height above touchdown zone elevation on glide slope at a RVR	X	X	X	X								Visual Ground Segment. This test is designed to assess items impacting the accuracy of the visual scene presented to a pilot at DH on an ILS approach. Those items include

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
		setting of 300 m (1 000 ft) or 350 m (1 200 ft) Static at 200 ft (61m) landing gear height above touchdown zone on glide slope with 550 metres or 1805ft RVR												1) RVR, 2) Glideslope (G/S) and localizer modeling accuracy (location and slope) for an ILS, 3) For a given weight, configuration and speed representative or a point within the helicopter's operational envelope for a nominal approach and landing.
Visual Ground Segment (VGS)								X	X		X	X	X	If non-homogenous fog is used, the vertical variation in horizontal visibility should be described and be included in the slant range visibility calculation used in the VGS computation. The downward field of view may be limited by the aircraft structure or the visual system display. whichever is the less.
b. Display System Tests														
1. (a) Continuous cross-cockpit visual field of view	Continuous visual field of view providing each pilot with 180º horizontal and 60º vertical field of view. Horizontal FOV: Not less	Not Applicable				X								Field of view should be measured using a visual test pattern filling the entire visual scene (all channels) considering of a matrix of black and white 5° squares

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	than a total of 176º (including not less than 75º measured either side of the centre of the design eye point). Vertical FOV: Not less than a total of 56 º measured from the pilot's and co-pilot's eye point.													white 5° squares. Installed alignment should be confirmed in a Statement of Compliance. The 75° minimums allows an offset either side of the horizontal field of view if required for the intended use.
1 (b) Continuous cross-cockpit visual field of view	Continuous visual field of view providing each pilot with 150º horizontal and 60º vertical field of view. Horizontal FOV: Not less than a total of 146º (including not less than 60º measured either side of the centre of the design eye point). Vertical FOV: Not less than a total of 56 º measured from the pilot's and co-pilot's eye point.	Not Applicable							X			X	X	Field of view should be measured using a visual test pattern filling the entire visual scene (all channels) considering of a matrix of black and white 5° squares. Installed alignment should be confirmed in a Statement of Compliance. The 60° minimums allows an offset either side of the horizontal field of view if required for the intended use.
1. (c) Continuous cross-cockpit visual field of	Continuous visual field of view	Not Applicable			X			X			X		X	Field of view should be measured using a visual test pattern

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
visual field of view	providing each pilot with 150º horizontal and 40º vertical field of view. Horizontal FOV: Not less than a total of 146º (including not less than 60º measured either side of the centre of the design eye point). Vertical FOV: Not less than a total of 36 º measured from the pilot's and co-pilot's eye point.													filling the entire visual scene (all channels) considering of a matrix of black and white 5° squares. Installed alignment should be confirmed in a Statement of Compliance. The 60° minimums allows an offset either side of the horizontal field of view if required for the intended use.
1. (d) Visual field of view	Visual system providing each pilot with 75º horizontal and 40º vertical field of view	Not Applicable		X										
	Visual system providing each pilot with 45º horizontal and 30º vertical field of view			X										
2. Occulting Demonstrate 10 levels of occulting through each channel of the system	Demonstration model	Not Applicable			X	X		X	X		X	X	X	
3. System geometry	5" even angular spacing within +1° as	Not Applicable	X	X	X	X		X	X		X	X	X	System geometry should be measured using a visual test pattern filling the

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	measured from either pilot eye-point, and within 1.5° for adjacent squares.													entire visual scene (all channels) consisting of a matrix of black and white 5° squats with light points at the intersections. The operator should demonstrate that the angular spacing of any chosen 5° square and the relative spacing of of adjacent squats are within the stated tolerances. The intent of this test is to demonstrate local linearity of the displayed image at either plot eye-point.
4. SurfaceContrast Ratio	Not less than 5:1. Demonstration model				X	X		X	X		X	X	X	Surface contrast ratio should be measured using a raster drawn test pattern filling the entire visual scene (all channels). The test pattern should consist of black and white squares, no larger than 10 degrees and no smaller than 5° per square with a white square in the centre in the centre of each channel. Measurement should be made on the centre bright square for each channel using a 1° spot photometer. This value should have a minimum brightness of 7 cd/m^2 (2 foot-

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
														lamberts). Measures any adjacent dark squares. The contrast ratio is the bright square value divided by the dark square value. *Note : During contrast ratio testing, FSTD aft-cab and flight deck ambient light levels should be zero.*
5. Highlight Brightness	Not less than 20 cd/m2 (6 foot-Lamberts) from the display measured at the design eye point	Not Applicable			X	X								Highlight brightness should be measured by maintaining the full test pattern described in paragraph 5.b 3 above, superimposing a highlight on the centre white square of each channel and measuring the brightness. Lightpoints are not acceptable. Use of calligraphic capabilities to enhance raster brightness is acceptable.
	Not less than 17 cd/m2 (5 foot-Lamberts) from the display measured at the design eye point							X	X		X	X	X	
6. Vernier Resolution	Not greater than 3 arc minutes	Not Applicable			X	X		X	X		X	X	X	Vernier resolution should be demonstrated by a test of objects shown to occupy the required visual angle in each visual display used on a scene from the pilot's eye-point.

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
7. Light point Size	Not greater than 6 arc minutes	Not Applicable			X	X			X					Lightpoint size should be measured using a test pattern consisting of a centrally located single row of lightpoints reduced in length until modulation is just discernible in each visual channel.
	Not greater than 8 arc minutes Demonstration model	Not Applicable						X			X	X	X	A row of 40 lights in the case of 6 arc minutes (30 lights in the case of 8 arc minutes) will form a 4° angle or less.
8. Light point Contrast Ratio	Not less than 25:1	Not applicable			X	X			X					Lightpoint contrast ratio should be measured using a test pattern demonstrating a1º area filled with lightpoints (i.e. lightpoint modulation just discernible) and should be compared to the adjacent background. Note. During contrast ratio testing, FSTD aft-cab and flight deck ambient light levels should be zero
	Not less than 5:1Demonstration model							X			X	X	X	
6 FSTD SYSTEMS														
a Visual, Motion and Cockpit Instrument Response														
(1) Transport Delay	200 milliseconds or less after control movement 150 milliseconds or less after control movement		X	X	X	X	X	X	X	X	X	X	X	One test is required in each axis (Pitch, Roll & Yaw)

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
	100 milliseconds or less after control movement													
(1) Transport Delay														This test should measure all the delay encountered by a step signal migrating from the pilot's control through the control loading electronics and interfacing through all the simulation software modules in the correct order, using a handshaking protocol, finally through the normal output interfaces to the motion system (where applicable), to the visual system and instrument displays. A recordable start time for the test should be provided by a pilot flight control input. The test mode should permit normal computation time to be consumed and should not alter the flow of information through the hardware/ software system. The Transport Delay of the system is then the time between control input and the individual hardware (systems)

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
														responses. It need only be measured once in each axis, being independent of flight conditions. Visual change may start before motion response but motion acceleration must occur before completion of visual scan of first video field that contains different information.
Latency														
(2) Visual, motion (where fitted), Instrument System response to an abrupt pilot controller input, compared to helicopter response for a similar input.	150 milliseconds or less after helicopter response'	Climb, Cruise and Descent	X	X										One test is required in each axis (pitch, roll. and yaw) for each of the flight conditions, compared to helicopter data. Visual change may start before motion response but motion acceleration must occur before completion of visual scan of first video field that contains different information
Latency (continued)	100 milliseconds or less after helicopter response	Climb, Cruise, Descent and Hover (Hover FFS only)			X	X			X					The test to determine compliance should include simultaneously recording the output from the pilot's cyclic, collective and pedals, the output from an accelerometer attached to the motion system platform located at an acceptable location near the pilot's seats (where applicable), the output from the

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
														visual system display (including visual system delays), and the output signal to the pilot's attitude indicator or an equivalent test approved by the Authority. The test results in a comparison of a recording of the simulator's response with actual helicopter data
b Sound														
(1) Realistic engine and rotor sounds	Not applicable									X				Statement of Compliance or demonstration of representative sounds
(2) Establish amplitude & frequency of flight deck sounds	Not applicable	On ground all engines on and Hover and Straight and Level flight	X	X	X			X	X		X	X	X	Rest results should show a comparison of the amplitude & frequency content of the sounds against data recorded at the initial FSTD qualification. NO reference data are required for initial FSTD qualification.
(2) Establish amplitude & frequency of flight deck sounds														All tests in this section should be presented using an unweighted 1/3-octave band format from band 17 to42 (50 Hz to 16 kHz). A minimum 20 second average should be taken at the location corresponding to the Helicopter data set. The Helicopter and flight simulator results should be produced using comparable

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
														data analysis techniques.
(i) Ready for engine start	± 5 dB per 1/3 octave band	Ground				X								Normal condition prior to engine start. The APU should be on if appropriate.
(ii) All engines at idle a) rotor not turning (If applicable) b) rotor turning	± 5 dB per 1/3 octave band	Ground				X								Normal condition prior to lift- off.
(iii) Hover	± 5 dB per 1/3 octave band	Hover				X								
(iv) Climb	± 5 dB per 1/3 octave band	En-route climb				X								Medium altitude.
(v) Cruise	± 5 dB per 1/3 octave band	Cruise				X								Normal cruise configuration.
(vi) Final approach	± 5 dB per 1/3 octave band	Landing				X								Constant airspeed, gear down.
(3) Special Cases	Not Applicable					C T & M								Special cases identified as particularly significant to the pilot, important in training, or unique to a specific helicopter type or variant.
(4) Flight Simulator Background noise	Initial evaluation: not applicable. Recurrent evaluation: ± 3dB per 1/3 octave band compared to initial evaluation					X								Results of the background noise at initial qualification should be included in the QTG document and approved by the qualifying authority. The simulated sound will be evaluated to ensure that the background noise does not interfere with training. The measurements are to be made with the simulation running, the sound muted and a dead cockpit.
(5) Frequency	Initial				X	X								Only required if the

TESTS	TOLERANCE	FLIGHT CONDITIONS	FFS LEVEL				FTD LEVEL			FNTP LEVEL				COMPLIANCE
			A	B	C	D	1	2	3	I	II	III	MCC	
Response	evaluation: not applicable. Recurrent evaluation: cannot exceed ± 5 dB on three consecutive bands when compared to initial evaluation and the average of the absolute differences between initial and recurrent evaluation results cannot exceed 2 dB.													results are to be used during recurrent evaluations .The results shall be acknowledged by the authority at initial qualification.

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				FTD			FNPT			
	A	B	C	D	1	2	3	I	II	III	MCC
a PREPARATION FOR FLIGHT											
Pre-Flight: Accomplish a functions check of all switches, indicators, systems and equipment at crew members and instructors stations and determine that the flight deck design and functions are identical to that of the helicopter within the scope of simulation. Pre-Flight: Accomplish a functions check of all switches, indicators, systems, and equipment at all crew members' and instructor's stations and determine that the flight deck design and functions represents those of a helicopter	X	X	X	X	X	X	X	X	X	X	X
b SURFACE OPERATIONS											
(1) Engine Start											X
(a) Normal Start	X	X	X	X	X	X	X	X	X	X	
(b) Alternate start procedures	X	X	X	X	X	X	X				
(c) Abnormal starts and shutdowns (hot start, hung start, fire, etc)	X	X	X	X	X	X	X	X	X	X	X
(2) Rotor start/engagement and acceleration											
(a) Rotor start/engagement and acceleration	X	X	X	X	X	X	X	X	X	X	X
(b) Ground resonance (if applicable on type).	X	X	X	X							
(3) Ground taxi (wheeled aircraft only)											
(a) Power/cyclic input		X	X	X							
(b) Collective lever/cyclic friction		X	X	X							
(c) Ground handling		X	X	X							

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				FTD			FNPT			
	A	B	C	D	1	2	3	I	II	III	MCC
(d) Brake operation		X X	X	X							
(e) Tail-/nosewheel lock operation		X	X	X							
(f) Other		X	X	X							
c HOVER											
(1) Liftoff		X	X	X							
(2) Hover		X	X	X		X	X		X	X	X
(3) Instrument response											
(a) Engine instruments		X	X	X		X	X		X	X	X
(b) Flight instruments		X	X X X	X		X	X		X	X	X
(4) Hovering turns			X	X		X	X		X	X	X
(5) Hover power checks											
(a) In ground effect (IGE)		X	X	X		X	X		X	X	X
(b) Out of ground effect (OGE)		X	X	X		X	X		X	X	X
(6) Anti-torque effect		X	X	X		X	X		X	X	X
(7) Abnormal/emergency procedures:											
(a) Engine failure(s)		X	X	X		X	X		X	X	X
(b) Fuel governing system failure		X	X	X		X	X		X	X	X
(c) Hydraulic system failure		X	X	X		X	X		X	X	X

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				FTD			FNPT			
	A	B	C	D	1	2	3	I	II	III	MCC
(d) Stability system failure		X	X	X		X	X		X	X	X
(e) Directional control malfunctions		X	X	X		X	X		X	X	X
(f) Other											
(8) Crosswind/tailwind hover											
d AIR TAXI/TRANSIT											
(1) Forward		X	X	X		X	X		X	X	X
(2) Sideways		X	X	X		X	X		X	X	X
(3) Rearward		X	X	X		X	X		X	X	X
e TAKE-OFF											
(1) Cat. B or single engine helicopters											
(a) Normal											X
(I) From hover		X	X	X		X	X		X	X	
(II) Crosswind/tailwind		X	X	X		X	X		X	X	X
(III) MTOM		X	X	X		X	X		X	X	X
(IV) Confined area		X	X	X			X			X	X
(V) Slope		X	X	X			X			X	X
(VI) Elevated heliport/helideck		X	X	X			X			X	X

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				**FTD**			**FNPT**			
	A	**B**	**C**	**D**	**1**	**2**	**3**	**I**	**II**	**III**	**MCC**
(VII) Vertical		X	X	X							
(b) abnormal / emergency procedures											
(I) Engine failure during take-off (If single engine, up to initiation of the flare)		X	X	X		X	X		X	X	X
(II) Forced landing (If single engine, up to initiation of the flare)		X	X	X		X	X		X	X	X
(2) Cat A operation for all certified profiles		X	X	X		X	X		X	X	X
Take-off with engine failure											
(i)engine failure prior to TDP		X	X	X		X	X		X	X	X
(ii) engine failure at or after TDP	X	X	X	X		X	X		X	X	X
f CLIMB											
(1) Cat.B or single engine helicopters											
(a) Clear area	X	X	X	X	X	X	X	X	X	X	X
(b)Obstacle clearance	X	X	X	X		X	X		X	X	X
(c)Vertical		X	X	X		X	X		X	X	X
(d) Engine failure	X	X	X	X		X	X		X	X	X
(2) Cat.A operation for all certified profiles with engine failure up to 300m (1000ft) above the level of the heliport	X	X	X	X		X	X		X	X	X
g CRUISE											
(1)Performance characteristics	X	X	X	X	X	X	X		X	X	X
(2)Flying qualities	X	X	X	X	X	X	X	X	X	X	X

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				FTD			FNPT			
	A	B	C	D	1	2	3	I	II	III	MCC
(3)Turns											
(a) Turns at Rate 1 and 2	X	X	X	X		X	X	X	X	X	X
b) Steep Turns	X	X	X	X		X	X	X	X	X	X
(4)Acceleration and decelerations	X	X	X	X							
(5)High airspeed vibration cues	X	X	X	X							
(6)Abnormal/emergency procedures											
(a) Engine fire	X	X	X	X		X	X		X	X	X
(b) Engine failure	X	X	X	X		X	X		X	X	X
(c) Inflight engine shutdown and restart	X	X	X	X		X	X		X	X	X
(e) Hydraulic failure	X	X	X	X		X	X		X	X	X
(f) Stability system failure	X	X	X	X		X	X		X	X	X
(g) Directional control malfunction	X	X	X	X		X	X		X	X	X
(h) Rotor vibration cues	X	X	X	X							
(I) Other	X	X	X	X		X	X				
h DESCENT											
(1) Normal	X	X	X	X	X	X	X	X	X	X	X
(2) Maximum rate	X	X	X	X		X	X	X	X	X	X
(3) Autorotative (until flare initiation)											
(a) Straight in		X	X	X		X	X		X	X	X

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				FTD			FNPT			
	A	B	C	D	1	2	3	I	II	III	MCC
(b) With turn		X	X	X		X	X		X	X	X
i VISUAL APPROACHES											
(1) Cat.B or single engine helicopters											
(a) Approach											
(i) Normal	X	X	X	X		X	X		X	X	X
(ii) Steep	X	X	X	X		X	X		X	X	X
(iii) Shallow	X	X	X	X		X	X		X	X	X
(iv) Vertical	X	X	X	X		X	X		X	X	X
(b) Abnormal and emergency procedures:											
(i) One engine inoperative											
(ii) Fuel governing failure	X	X	X	X		X	X		X	X	X
(iii) Hydraulics failure	X	X	X	X		X	X		X	X	X
(iv) Stability system failure	X	X	X	X		X	X		X	X	X
(V) Directional control failure	X	X	X	X		X	X		X	X	X
(VI) Autorotation		X	X	X		X	X		X	X	X
(VII) Other	X	X	X	X		X	X				
(c) Balked landing											
(I) All engines operating	X	X	X	X		X	X		X	X	X
(II) One or more engines inoperative	X	X	X	X		X	X		X	X	X
(2) Cat.A operation for all certified profiles											
(a) from 300m (1000ft) above the level of the heliport to or after LDP	X	X	X	X		X	X		X	X	X
j INSTRUMENT APPROACHES											

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				**FTD**			**FNPT**			
	A	**B**	**C**	**D**	**1**	**2**	**3**	**I**	**II**	**III**	**MCC**
Only those instrument approach tests relevant to the simulated helicopter type or system(s) and MCC training should be selected from the following list.											
(1) Non-precision											
(a) All engines operating	X	X	X	X	X	X	X		X	X	X
(b) One or more engines inoperative	X	X	X	X	X	X	X		X	X	X
(c) Approach procedures:											
(i) NDB	X	X	X	X	X	X	X		X	X	X
(ii) VOR/DME, RNAV	X	X	X	X	X	X	X		X	X	X
(iii) ARA (Airborne radar approach)	X	X	X	X	X	X	X		X	X	X
(iv) GPS	X	X	X	X	X	X	X		X	X	X
(v) Other	X	X	X	X	X	X	X		X	X	X
(d) Missed approach											
(i) All engines operating	X	X	X	X	X	X	X		X	X	X
(ii) One or more engines inoperative	X	X	X	X	X	X	X		X	X	X
(ii) Auto-pilot failure	X	X	X	X	X	X	X		X	X	X
(2) Precision											
(a) All engines operating	X	X	X	X	X	X	X		X	X	X
(b) One or more engines inoperative	X	X	X	X	X	X	X		X	X	X
(c) Approach procedures:	X	X	X	X	X	X	X		X	X	X
(i) DGPS	X	X	X	X	X	X	X		X	X	X
(ii) ILS	X	X	X	X	X	X	X		X	X	X
• Manual without Flight Director, • Manual with Flight Director • Auto pilot coupled											

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				FTD			FNPT			
	A	B	C	D	1	2	3	I	II	III	MCC
• CAT I • CAT II											
(iii) Other	X	X	X	X	X	X	X		X	X	X
(d) Missed approach											
(i) All engines operating	X	X	X	X	X	X	X		X	X	X
(ii) One or more engines inoperative	X	X	X	X	X	X	X		X	X	X
(iii) Auto pilot failure	X	X	X	X	X	X	X		X	X	X
k APPROACH TO LANDING AND TOUCHDOWN											
(1) Cat B or single engine helicopters											
(a) Normal approach											
(i) To a hover		X	X	X		X	X		X	X	X
(ii) Elevated heliport/helideck		X	X	X			X			X	X
(iii) Confined area		X	X	X			X			X	X
(iv) Crosswind/tailwind		X	X	X		X	X		X	X	X
(v) Other		X	X	X		X	X		X	X	X
(b) Touchdown											
(i) From a hover		X	X	X		X	X		X	X	X
(ii) Running		X	X	X		X	X		X	X	X
(iii) Slope			X	X			X			X	
(c) Abnormal and emergency procedures during approach to landing and touchdown											

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				**FTD**			**FNPT**			
	A	**B**	**C**	**D**	**1**	**2**	**3**	**I**	**II**	**III**	**MCC**
(i) One engine inoperative	X	X	X	X		X	X		X	X	X
(ii) Fuel governing failure	X	X	X	X		X	X		X	X	X
(iii) Hydraulics failure	X	X	X	X		X	X		X	X	X
(iv) Stability system failure	X	X	X	X		X	X		X	X	X
(v) Directional control failure	X	X	X	X		X	X		X	X	X
(vi) Autorotation	X	X	X	X		X	X		X	X	X
(vii) Other	X	X	X	X		X	X		X	X	X
(2) Cat. A operation for all certified profiles											
Landing with engine failure											
(i) engine failure prior to or at LDP		X	X	X		X	X		X	X	X
(ii) engine failure at or after LDP		X	X	X		X	X		X	X	X
I ANY FLIGHT PHASE											
(1) Helicopter and powerplant systems operation (As applicable)											
(a) Air conditioning	X	X	X	X	X	X	X		X	X	X
(b) Anti-icing/de-icing	X	X	X	X	X	X	X		X	X	X
(c) Auxiliary powerplant	X	X	X	X	X	X	X		X	X	X
(d) Communications	X	X	X	X	X	X	X		X	X	X
(e) Electrical	X	X	X	X	X	X	X		X	X	X
(f) Lighting systems (internal and external)	X	X	X	X	X	X	X		X	X	X
(g) Fire and smoke detection and suppression	X	X	X	X	X	X	X		X	X	X
(h) Stabilizer	X	X	X	X	X	X	X		X	X	X
(i) Flight controls/antitorque systems	X	X	X	X	X	X	X		X	X	X
(j) Fuel and oil	X	X	X	X		X	X		X	X	X

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				FTD			FNPT			
	A	B	C	D	1	2	3	I	II	III	MCC
(k) Hydraulic	X	X	X	X	X	X	X		X	X	X
(l) Landing gear	X	X	X	X	X	X	X		X	X	X
(m) Power plant	X	X	X	X	X	X	X		X	X	X
(n) Transmission systems	X	X	X	X	X	X	X		X	X	X
(o) Rotor systems	X	X	X	X	X	X	X		X	X	X
(p) Flight control computers	X	X	X	X	X	X	X		X	X	X
(q) Stability and control augmentation systems (SAS)	X	X	X	X	X	X	X		X	X	X
(r) Voice activated systems	X	X	X	X	X	X	X		X	X	X
(s) Other	X	X	X	X	X	X	X		X	X	X
(2) Flight management and guidance systems (as applicable)											
(a) Airborne radar	X	X	X	X	X	X	X		X	X	X
(b) Automatic landing aids	X	X	X	X	X	X	X		X	X	X
(c) Autopilot	X	X	X	X	X	X	X		X	X	X
(d) Collision avoidance systems (GPWS, TCAS,…)	X	X	X	X	X	X	X		X	X	X
(e) Flight data displays	X	X	X	X	X	X	X		X	X	X
(f) Flight management computers	X	X	X	X	X	X	X		X	X	X
(g) Head-up displays	X	X	X	X	X	X	X		X	X	X
(h) Navigation system	X	X	X	X	X	X	X		X	X	X
(i) NVG	X	X	X	X	X	X	X		X	X	X
(j) Other	X	X	X	X	X	X	X		X	X	X
(3) Airborne procedures											
(a) Quickstop			X	X		X	X		X	X	X
(b) Holding pattern	X	X	X	X		X	X	X	X	X	X
(c) Hazard avoidance (GPWS, TCAS, Weather radar, …) as applicable, except for Weather Radar required for MCC training in FNPT.			X	X		X	X		X	X	X

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				FTD			FNPT			
	A	B	C	D	1	2	3	I	II	III	MCC
(d) Retreating blade stall recovery (As applicable)		X	X	X		X	X		X	X	X
(e) Rotor mast bumping (As applicable)	X	X	X	X		X	X		X	X	X
(f) Vortex ring		X	X	X		X	X		X	X	X
m ENGINE SHUTDOWN AND PARKING											
(1) Engine and systems operation	X	X	X	X	X	X	X	X	X	X	X
(2) Parking brake operation	X	X	X	X	X	X	X		X	X	X
(3) Rotor brake operation	X	X	X	X	X	X	X		X	X	X
(4) Abnormal and emergency procedures	X	X	X	X	X	X	X		X	X	X
(5) Other	X	X	X	X	X	X	X		X	X	X
n MOTION EFFECTS											
(1) Runway rumble, oleo deflections, effects of groundspeed and uneven surface haracteristics		X	X	X							
(2) Buffet due to translational lift		X	X	X							
(3) Buffet during extension and retraction of landing gear		X	X	X							
(4) Buffet due to high speed and retreating blade stall		X	X	X							
(5) Buffet due to vortex ring		X	X	X							
(6) Representative cues resulting from touchdown		X	X	X							
(7) Rotor(s) vibrations (motion cues)	X	X	X	X							
(8) Translational lift		X	X	X							
(9) Loss of anti-torque device effectiveness		X	X	X							
o SOUND SYSTEM											
Significant helicopter noises should include:											
(1) Engine, rotor and transmission to a comparable level found in the	X	X	X	X	X	X	X	X	X	X	X

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				FTD			FNPT			
	A	B	C	D	1	2	3	I	II	III	MCC
helicopter.											
(2) Sounds of a crash should be related to a logical manner to landing in an unusual attitude or in excess of structural limitations of the helicopter.	X	X	X	X		X	X	X	X	X	
(3) Significant flight deck sounds and those which result from pilot's actions.	X	X	X	X	X	X	X		X	X	X
p SPECIAL EFFECTS											
(1) Effects of icing			X	X		X	X		X	X	X
(a) Airframe			X	X		X	X		X	X	X
(b) Rotors			X	X							
(2) Effects of rotor contamination.											
q VISUAL SYSTEM											
(1) Accurate portrayal of environment relating to simulator attitudes and position.	X	X	X	X		X	X		X	X	X
(2) Heliports											
(a)The distances at which heliport features are visible should not be less than those listed below. Distances are measured from the FATO centre to a helicopter aligned with the FATO approach direction on an extended 3-degree glideslope.											
(i) Heliport definition, strobe lights, approach lights from 8km	X	X	X	X		X	X		X	X	X
(ii) Visual approach Aids and FATO/LOF edge lights should be visible from 5km through approach angles up to 12 degrees	X	X	X	X		X	X		X	X	X
(iii) FATO/LOF edge lights and taxiway definition from 3km	X	X	X	X		X	X		X	X	X

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				**FTD**			**FNPT**			
	A	**B**	**C**	**D**	**1**	**2**	**3**	**I**	**II**	**III**	**MCC**
(iv) FATO and TLOF markings within range of landing lights for night scenes	X	X	X	X		X	X		X	X	X
(v) FATO and TLOF markings as required by surface resolution on day scenes	X	X	X	X		X	X		X	X	X
(b) At least three different heliport scenes which should be:											
(i) an airport	X	X	X	X		X	X		X	X	X
(ii) a surface level confined area and		X	X	X			X			X	X
(iii) an elevated heliport		X	X	X			X			X	X
(c) Representative heliport scene content including the following:											
(i) Surfaces and markings on runways, heliport, taxiways and ramps	X	X	X	X		X	X		X	X	X
(ii) Lighting for the FATO/TLOF, visual approach aids and approach lighting of appropriate colours	X	X	X	X		X	X		X	X	X
(iii) Heliport perimeter and taxiway lighting	X	X	X	X		X	X		X	X	X
(iv) Ramps and terminal buildings and vertical objects which correspond to the operational requirements of an operator's LOFT scenario.	X	X	X	X		X	X		X	X	X
(v) The directionality of strobe lights, approach lights, runway edge lights, visual landing aids, runway centre line lights, threshold lights, and touchdown zone lights on the runway of intended landing should be realistically replicated	X	X	X	X		X	X		X	X	X
(3) Representative visual effect of helicopter external lighting in reduced visibility, such as reflected glare, to include landing lights, strobes, and beacons		X	X	X		X	X		X	X	X

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				**FTD**			**FNPT**			
	A	**B**	**C**	**D**	**1**	**2**	**3**	**I**	**II**	**III**	**MCC**
(4) Instructor controls of the following:											
(a) Cloud base/cloud tops;	X	X	X	X		X	X		X	X	X
(b) Visibility in kilometres/nautical miles and RVR in meters/feet;	X	X	X	X		X	X		X	X	X
(c) Airport/heliport selection;	X	X	X	X		X	X		X	X	X
(d) Airport/heliport lighting;	X	X	X	X		X	X		X	X	X
(e) ground and flight traffic.			X	X		X	X				X
(5) Visual system compatibility with aerodynamic programming	X	X	X	X		X	X		X	X	X
(6) Visual cues to assess sink rate displacements, rates and height AGL during landings (e.g. runways/heliports, taxiways, ramps and terrain features).		X	X	X		X	X		X	X	X
(7) visual scene capability.											
(a) Twilight and night	X	X									
(b) Twilight, night and day			X	X		X	X		X	X	X
(8) General terrain characteristics.		X	X	X		X	X			X	X
Below 5000ft present realistic visual scene permitting navigation by sole reference to visual landmarks. Terrain contouring should be suitably represented.											
(9) At and below 610m (2000ft) height above the airport/heliport and within a radius of 16											

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				**FTD**			**FNPT**			
	A	**B**	**C**	**D**	**1**	**2**	**3**	**I**	**II**	**III**	**MCC**
kilometres (9NM) from the airport/heliport, weather representations, including the following;											
(a) Variable cloud density			X	X							
(b) Partial obscuration of ground scenes; the effect of a scattered to broken cloud deck			X	X		X	X			X	X
(c) Visual cues of speed through clouds				X							
(d) Gradual break out			X	X		X	X			X	X
(e) Visibility and RVR measured in terms of distance.	X	X	X	X		X	X		X	X	X
(f) Patchy fog			X	X							
(g) The effect of fog on airport/heliport lighting.			X	X		X	X			X	X
(10) A capability to present ground and air hazards such as another aircraft crossing the active runway and converging airborne traffic			X	X							X
(11) Operational visual scenes which provide a cue rich environment sufficient for precise low airspeed and low altitude manoeuvring and landing.			X	X		X	X			X	X
(12) Operational visual scenes which portray representative physical relationships known to cause landing illusions such as short runways, landing approaches over water, uphill, downhill and sloping landing areas, rising terrain on the approach path, and unique topographic features				X							
Note - Illusions may be demonstrated at a generic airport or specific aerodrome.											

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				**FTD**			**FNPT**			
	A	**B**	**C**	**D**	**1**	**2**	**3**	**I**	**II**	**III**	**MCC**
(13) Special weather representations of light, medium, heavy precipitation and lighting near a thunderstorm on takeoff, approach and landing at and below an altitude of 610m (2000 feet) above the airport/heliport surface and within a radius of 16 kilometres (9 NM) from the airport/heliport.				X							
(14) Wet and snow-covered landing areas including runway/heliport lighting reflections for wet, partially obscured lights for snow or suitable alternative effects.				X							
(15) The effects of swell and wind on a 3 dimensional ocean model should be simulated.				X							
(16) The effects of own helicopter downwash upon various surfaces such as snow, sand, dirt and grass should be simulated including associated effects of reduced visibility.				X							
(17) Realistic colour and directionality of airport/heliport lighting.	X	X	X	X		X	X		X	X	X
(18) The visual scene should correlate with integrated helicopter systems, where fitted (e.g. terrain, traffic and weather avoidance systems and Head-up Guidance System (HGS) (For FTD and FNPT may be restricted to specific geographical areas.) Weather radar presentations in helicopters where radar information is presented on the pilot's navigation instruments. Radar returns should correlate to the visual scene.			X	X		X	X				X
(19) Dynamic visual representation of rotor tip path plane including effects of rotor start up and shut down as well as orientation of the rotor disc due to pilot control input.			X	X							

FUNCTIONS AND SUBJECTIVE TESTS											
	FFS				**FTD**			**FNPT**			
	A	**B**	**C**	**D**	**1**	**2**	**3**	**I**	**II**	**III**	**MCC**
(20) To support LOFT, the visual system should provide smooth transition to new operational scenes without flight through clouds.				X			X			X	X
(21) The visual system should provide appropriate height and 3-D object collision detection feedback to support training.			X	X		X	X		X	X	X
(22) Scene quality											
(a) surfaces and textural cues should be free from distracting quantization (aliasing)	X	X	X	X		X	X		X	X	
(b) the system light points should be free from distracting jitter, smearing or streaking			X	X							
(c) system capable of six discrete light step controls (0-5)	X	X	X	X		X	X		X	X	X

APPENDIX D

FORM CA 2002H

	GOVERNMENT OF INDIA **DIRECTOR GENERAL OF CIVIL AVIATION**	**Application** **for** **Evaluation of Flight Simulator**
1. (a) Name of Simulator operator (b) Address (c) Location (d) Phone (e) Fax: (f) e-mail:		
2. Reason for Submission:		Initial / Upgrade
3. Name of simulator manufacturer		
4. Type of Simulator		
5. Identification number of simulator		
6. Helicopter being simulated (a) model (b) series		
7. Engine (a) model (b) Series (c) data revision		
8. Level of qualification requested	A / B / C / D	OA /OB / OC / OD
9. Simulator Computer Identification		
10. Date of Simulator manufacture		
11. Aerodynamic data revision		
12. Flight control data revision		
13. Motion system (a) type (b) manufacturer		
14. Details of visual system manufacturer		
15. List of all reference source data		

16. Recording procedures and equipment required for the validation tests	
17. Glossary of terms and symbols used	
18. Dates for the proposed evaluation	
19. (a) Tentative date for submission of QTG along with (b) List of outstanding QTG tests are outstanding (to be submitted not later than 30 days prior to proposed evaluation) The following:	
20. Name and Qualification of Manager (Quality System)	
21. Names & qualification of simulator evaluation team)	
22. No. and names of Qualified Simulator personnel available.	
23. Existing DGCA Authority/Approval if any.	
24. Details of fees remitted	Amount : Rs …….. DD No. & Date No : ……..……
25. The simulator has been assessed by the evaluation team and it conforms to the helicopter cockpit configuration of helicopter type ……and that the simulated systems and sub-systems function equivalently to those in that helicopter. The team has also assessed the performance and the flying qualities of the simulator and finds that it represents the designated helicopter. (to be submitted not later than 7 days prior to proposed evaluation)	
26. Date : …….	Signature of the applicant : …….. Name of the applicant : ……..

Note 1. For initial qualification testing of flight simulators the helicopter manufacturer Validation flight test data is preferred. Data from other sources may be used, subject to review and concurrence by the DGCA.

Note 2. SOCs should refer to the sources of information and show compliance to explain how the referred material is used, applicable mathematical equations, parameter values, and conclusion reached.

Note 3. Qualification in items 21 and ,22, imply the designation of the evaluation team personnel such as pilot examiner/instructor/ check pilot/ simulator engineer as applicable.

APPENDIX E

QUALITY SYSTEM

1 Introduction

1.1 In order to show compliance with this CAR, an FSTD operator should establish his Quality System in accordance with the instructions and information contained in the following paragraphs.

2 General

2.1 Terminology

a. The terms used in the context of the requirement for an FSTD operator's Quality System have the following meanings:

(i) Accountable Manager. The person acceptable to the Authority who has corporate authority for ensuring that all necessary activities can be financed and carried out to the standard required by the Authority, and any additional requirements defined by the FSTD operator.

(ii) Quality Assurance. All those planned and systematic actions necessary to provide adequate confidence that specified performance, functions and characteristics satisfy given requirements.

(iii) Quality Manager. The manager, acceptable to the Authority, responsible for the management of the Quality System, monitoring function and requesting corrective actions.

2.2 **Quality Policy**

2.2.1 An FSTD operator should establish a formal written Quality Policy Statement that is a commitment by the Accountable Manager as to what the Quality System is intended to achieve. The Quality Policy should reflect the achievement and continued compliance with this CAR together with any additional standards specified by the FSTD operator.

2.2.2 The Accountable Manager is an essential part of the FSTD qualification holder's organisation. With regard to the above terminology, the term 'Accountable Manager' is intended to mean the Chief Executive/President/Managing Director/General Manager etc. of the FSTD operator's organisation, who by virtue of his position has overall responsibility (including financial) for managing the organisation.

2.2.3 The Accountable Manager will have overall responsibility for the FSTD qualification holder's Quality System including the frequency, format and structure of the internal management evaluation activities as prescribed in paragraph 4.9 below.

2.3 Purpose of the Quality System

2.3.1 The Quality System should enable the FSTD operator to monitor compliance

with this CAR, and any other standards specified by that FSTD operator, or the Authority, to ensure correct maintenance and performance of the device.

2.4 **Quality Manager**

2.4.1 The primary role of the Quality Manager is to verify, by monitoring activity in the fields of FSTD qualification, that the standards required by the Authority, and any additional requirements defined by the FSTD operator, are being carried out under the supervision of the relevant Manager.

2.4.2 The Quality Manager should be responsible for ensuring that the Quality Assurance Programme is properly established, implemented and maintained.

2.4.3 The Quality Manager should:

a. Have direct access to the Accountable Manager;

b. Have access to all parts of the FSTD operator's and, as necessary, any sub-contractor's organisation.

2.4.4 The posts of the Accountable Manager and the Quality Manager may be combined by FSTD operators whose structure and size may not justify the separation of those two posts. However, in this event, Quality Audits should be conducted by independent personnel.

3 Quality System

3.1 Introduction

3.1.1 The FSTD operator's Quality System should ensure compliance with FSTD qualification requirements, standards and procedures.

3.1.2 The FSTD operator should specify the structure of the Quality System.

3.1.3 The Quality System should be structured according to the size and complexity of the organisation to be monitored.

3.2 Scope

3.2.1 As a minimum, the Quality System should address the following:

a. The provisions of this CAR.
b. The FSTD operator's additional standards and procedures.
c. The FSTD operator's Quality Policy.
d. The FSTD operator's organisational structure.
e. Responsibility for the development, establishment and management of the Quality System.
f. Documentation, including manuals, reports and records.
g. Quality Procedures.
h. Quality Assurance Programme.
i. The provision of adequate financial, material and human resources.
j. Training requirements for the various functions in the organisation.

3.2.2 The Quality System should include a feedback system to the Accountable Manager to ensure that corrective actions are both identified and promptly addressed. The feedback system should also specify who is required to rectify

discrepancies and non-compliance in each particular case, and the procedure to be followed if corrective action is not completed within an appropriate timescale.

3.3 Relevant Documentation

3.3.1 Relevant documentation should include the following:

a. Quality Policy.
b. Terminology.
c. Reference to specified FSTD technical standards.
d. A description of the organisation.
e. The allocation of duties and responsibilities.
f. Qualification procedures to ensure regulatory compliance.

The Quality Assurance Programme, reflecting:

(i) Schedule of the monitoring process.
(ii) Audit procedures.
(iii) Reporting procedures.
(iv) Follow-up and corrective action procedures. (v) Recording system.
(vi) Document control.

4. Quality Assurance Programme

4.1 Introduction

4.1.1 The Quality Assurance Programme should include all planned and systematic actions necessary to provide confidence that all maintenance is conducted and all performance maintained in accordance with all applicable requirements, standards and procedures.

4.1.2 When establishing a Quality Assurance Programme, consideration should, at least, be given to the paragraphs 4.2 to 4.9 below.

4.2 Quality Inspection

4.2.1 The primary purpose of a quality inspection is to observe a particular event/action/document etc., in order to verify whether established procedures and requirements are followed during the accomplishment of that event and whether the required standard is achieved.

4.2.2 Typical subject areas for quality inspections are:

a. Actual FSTD operation
b. Maintenance
c. Technical standards.
d. FSTD safety features.

4.3 Audit

4.3.1 An audit is a systematic and independent comparison of the way in which an activity is being conducted against the way in which the published procedures say it should be conducted.

4.3.2 Audits should include at least the following quality procedures and processes:

a. A statement explaining the scope of the audit.
b. Planning and preparation.
c. Gathering and recording evidence; and
d. Analysis of the evidence.

4.3.3 Techniques which contribute to an effective audit are:

a. Interviews or discussions with personnel.
b. A review of published documents.
c. The examination of an adequate sample of records.
d. The witnessing of the activities which make up the operation; and
e. The preservation of documents and the recording of observations.

4.4 Auditors

4.4.1 An FSTD operator should decide, depending on the complexity and size of the organisation, whether to make use of a dedicated audit team or a single auditor. In any event, the auditor or audit team should have relevant FSTD experience.

4.4.2 The responsibilities of the auditors should be clearly defined in the relevant documentation.

4.5 Auditor's Independence

4.5.1 Auditors should not have any day to day involvement in the area of activity which is to be audited.

An FSTD operator may, in addition to using the services of full-time dedicated personnel belonging to a separate quality department, undertake the monitoring of specific areas or activities by the use of part-time auditors. Due to the technological complexity of FSTDs, which requires auditors with very specialised knowledge and experience, an FSTD operator may undertake the audit function by the use of part-time personnel from within his own organisation or from an external source under the terms of an agreement acceptable to the Authority. In all cases the FSTD operator should develop suitable procedures to ensure that persons directly responsible for the activities to be audited are not selected as part of the auditing team. Where external auditors are used, it is essential that any external specialist is familiar with the type of device conducted by the FSTD operator.

4.5.2 The FSTD operator's Quality Assurance Programme should identify the persons within the company who have the experience, responsibility and authority to:

a. Perform quality inspections and audits as part of ongoing Quality Assurance.
b. Identify and record any concerns or findings, and the evidence necessary to substantiate such concerns or findings.
c. Initiate or recommend solutions to concerns or findings through designated reporting channels.
d. Verify the implementation of solutions within specific time scales.
e. Report directly to the Quality Manager.

4.6 Audit Scope

4.6.1 FSTD operators are required to monitor compliance with the procedures they have designed to ensure specified performance and functions. In doing so they should as a minimum, and where appropriate, monitor:

a. Organisation.
b. Plans and objectives.
c. Maintenance procedures.
d. FSTD Qualification Level.
e. Supervision.
f. FSTD technical status.
g. Manuals, logs, and records.
h. Defect deferral.
i. Personnel training.
j. Helicopter modifications management.

4.7 Auditing scheduling

4.7.1 A Quality Assurance Programme should include a defined audit schedule and a periodic review. The schedule should be flexible, and allow unscheduled audits when trends are identified. Follow- up audits should be scheduled when necessary to verify that corrective action was carried out and that it was effective.

4.7.2 An FSTD operator should establish a schedule of audits to be completed during a specified calendar period. All aspects of the operation should be reviewed within every period of 12 months in accordance with the programme unless an extension to the audit period is accepted as explained below. An FSTD operator may increase the frequency of audits at his discretion but should not decrease the frequency without the agreement of the Authority.

4.7.3 When an FSTD operator defines the audit schedule, significant changes to the management, organisation, or technologies should be considered as well as changes to the regulatory requirements.

4.7.4 For FSTD operators whose structure and size may not justify the completion of a complex system of audits, it may be appropriate to develop a Quality Assurance Programme that employs a checklist. The checklist should have a supporting schedule that requires completion of all checklist items within a specified time scale, together with a statement acknowledging completion of a periodic review by top management.

4.7.5 Whatever arrangements are made, the FSTD operator retains the ultimate responsibility for the
Quality System and especially the completion and follow up of corrective actions.

4.8 Monitoring and Corrective Action

4.8.1 The aim of monitoring within the Quality System is primarily to investigate and judge its effectiveness and thereby to ensure that defined policy, performance and function standards are continuously complied with.

Monitoring activity is based upon quality inspections, audits, corrective action and follow-up. The FSTD operator should establish and publish a quality procedure to monitor regulatory compliance on a continuing basis. This monitoring activity should be aimed at eliminating the causes of unsatisfactory performance.

4.8.2 Any non-compliance identified as a result of monitoring should be communicated to the manager responsible for taking corrective action or, if appropriate, the Accountable Manager. Such non- compliance should be recorded, for the purpose of further investigation, in order to determine the cause and to enable the recommendation of appropriate corrective action.

4.8.3 The Quality Assurance Programme should include procedures to ensure that corrective actions are taken in response to findings. These quality procedures should monitor such actions to verify their effectiveness and that they have been completed. Organisational responsibility and accountability for the implementation of corrective actions resides with the department cited in the report identifying the finding. The Accountable Manager will have the ultimate responsibility for resourcing the corrective action and ensuring, through the Quality Manager, that the corrective action has re- established compliance with the standard required by the Authority, and any additional requirements defined by the FSTD operator.

4.8.4 Corrective action

a. Subsequent to the quality inspection/audit, the FSTD operator should establish:
b. The seriousness of any findings and any need for immediate corrective action.
c. Cause of the finding.
d. Corrective actions required to ensure that the non-compliance does not recur.
e. A schedule for corrective action.
f. The identification of individuals or departments responsible for implementing corrective action.
g. Allocation of resources by the Accountable Manager, where appropriate.

4.8.5 The Quality Manager should:

a. Verify that corrective action is taken by the manager responsible in response to any finding of non- compliance.
b. Verify that corrective action includes the elements outlined in paragraph 4.8.4 above.
c. Monitor the implementation and completion of corrective action.
d. Provide management with an independent assessment of corrective action, implementation and completion.
e. Evaluate the effectiveness of corrective action through the follow-up process.

4.9 Management Evaluation

4.9.1 A management evaluation is a comprehensive, systematic, documented

review of the Quality System and procedures by the management, and it should consider:

a. The results of quality inspections, audits and any other indicators.
b. The overall effectiveness of the management organisation in achieving stated objectives.

4.9.2 A management evaluation should identify and correct trends, and prevent, where possible, future non-conformities. Conclusions and recommendations made as a result of an evaluation should be submitted in writing to the responsible manager for action. The responsible manager should be an individual who has the authority to resolve issues and take action.

4.9.3 The Accountable Manager should decide upon the frequency, format, and structure of internal management evaluation activities.

4.10 Recording

4.10.1 Accurate, complete, and readily accessible records documenting the results of the Quality Assurance Programme should be maintained by the FSTD operator. Records are essential data to enable an FSTD operator to analyse and determine the root causes of non-conformity, so that areas of non-compliance can be identified and addressed.

4.10.2 The following records should be retained for a period of 5 years:

a. Audit schedules.
b. Quality inspection and audit reports.
c. Response to findings.
d. Corrective action reports.
e. Follow-up and closure reports; and
f. Management evaluation reports.

5 Quality Assurance responsibility for sub-contractors

5.1 Sub-contractors

5.1.1 FSTD operators may decide to sub-contract out certain activities to external agencies for the provision of services related to areas such as:

a. Maintenance.
b. Manual preparation.

5.1.2 The ultimate responsibility for the product or service provided by the sub-contractor always remains with the FSTD operator. A written agreement should exist between the FSTD operator and the sub- contractor clearly defining the services and quality to be provided. The sub-contractor's activities relevant to the agreement should be included in the FSTD operator's Quality Assurance Programme.

5.1.3 The FSTD operator should ensure that the sub-contractor has the necessary authorisation/approval when required, and commands the resources and competence to undertake the task. If the FSTD operator requires the sub-contractor to conduct activity which exceeds the sub-contractor's authorisation/approval, the FSTD operator is responsible for ensuring that the sub-contractor's

Quality Assurance takes account of such additional requirements.

6 Quality System Training

6.1 General

6.1.1 An FSTD operator should establish effective, well planned and resourced quality related briefing for all personnel.

6.1.2 Those responsible for managing the Quality System should receive training covering:

a. An introduction to the concept of the Quality System.
b. Quality management.
c. Concept of Quality Assurance.
d. Quality manuals.
e. Audit techniques.
f. Reporting and recording; and
g. The way in which the Quality System will function in the organisation.

6.1.3 Time should be provided to train every individual involved in quality management and for briefing the remainder of the employees. The allocation of time and resources should be sufficient for the scope of the training.

6.2 Sources of Training

6.2.1 Quality management courses are available from the various national or international Standards Institutions, and an FSTD operator should consider whether to offer such courses to those likely to be involved in the management of Quality Systems. FSTD operators with sufficient appropriately qualified staff should consider whether to carry out in-house training.