

# **Singapore Air Safety Publication Part 11**

## **Flight Simulation Training Devices (Aeroplane and Helicopter)**

Publication of the  
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*Copies of this document may be obtained from  
the CAAS website at [www.caas.gov.sg](http://www.caas.gov.sg)*

## FOREWORD

Pursuant to paragraph 20(14) of the Air Navigation Order (ANO), this Singapore Air Safety Publication (SASP) contains, inter alia, the requirements for the grant and renewal of the Certificate of Qualification for Flight Simulation Training Devices (Aeroplane and Helicopter). This SASP also contains the requirements for the grant of a Certificate of Qualification for an FSTD and an Approval to Use a qualified or recognised FSTD which allows an applicant to make use of the qualified simulator to conduct training, testing and checking pursuant to paragraphs 20(14)(e) and 20(14)(f) of the ANO.

2 A person referred to in paragraphs 20(14)(b), (e) and (f) shall comply with the requirements contained in this SASP as amended from time to time.

3 Failure to comply with any requirements contained in this SASP may result in suspension or revocation of the Certification of Qualification or the Approval to Use a qualified FSTD, or both.

4 Amendments to this SASP will be notified through Notice of Amendments (NOA).

5 Queries relating to this SASP should be referred to:

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## CHAPTER 1      APPLICABILITY

- 1.1 This SASP is applicable to any person or organisation who offers or uses a Flight Simulation Training Device (FSTD) for:
  - (a) Training and tests leading to the grant of a Singapore flight crew licence, or the grant or renewal of ratings associated with this licence; or
  - (b) Proficiency training and checks associated with a holder of a Singapore Air Operator Certificate, a training organisation approved under paragraph 20(14)(e), (f) of the ANO (ATO) or an owner of a Singapore registered aircraft.
- 1.2 An applicant for a Certificate of Qualification for an FSTD for use for the above-mentioned purposes must meet the requirements contained in Chapter 3 of this SASP before the Director-General of Civil Aviation (DGCA) is able to grant the applicant a Certificate of Qualification for the FSTD. A person who is directly responsible to the DGCA for requesting and maintaining the qualification of a particular FSTD is referred as the FSTD operator.
- 1.3 To ensure the continued validity of a Certificate of Qualification, the FSTD operator must comply with the requirements and procedures contained in this SASP.
- 1.4 A person who intends to use the FSTD to conduct a test or a course of flight training or instruction in the FSTD must meet the requirements contained in Chapter 4 of this SASP, and seek the DGCA's Approval to Use before he is allowed to use a qualified or recognised FSTD for such purposes. The DGCA may grant the person the Approval to Use or to include such Approval as part of the approved training programme of an ATO.

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## CHAPTER 2      TERMINOLOGIES

### 2.1      Definitions

The following definitions are applicable in this SASP.

**Checking**, (*in the context of pilot proficiency*) means the comparison of the knowledge about a task, or the skill or ability to perform a task, against an established set of criteria to determine that the knowledge, skill or ability observed meets or exceeds, or does not meet, those criteria.

**Fidelity level** means the level of realism assigned to each of the defined FSTD features. The level of fidelity level includes:

*Generic (G)* – The lowest level of required fidelity for a given FSTD feature;

*Representative (R)* – The intermediate level of required fidelity for a given FSTD feature;

*Specific (S)* – The highest level of required fidelity for a given FSTD feature.

**FSTD operator** means the person who operates an FSTD for the purpose or use for which it was approved;

**Master qualification test guide (MQTG)** means the test guide that incorporates the results of tests conducted at the initial qualification.

**Qualified FSTD** means an FSTD that has been issued with a Certificate of Qualification under paragraph 20(12) of the Air Navigation Order.

**Qualification test guide (QTG)** means the primary reference document used for the evaluation of an FSTD. It contains test results, statements of compliance and the other information to enable the evaluator to assess if the FSTD meets the test criteria described in this manual.

**Testing (in relation to pilot proficiency)** means the comparison of the knowledge about a task, or the skill or ability to perform a task, against an established set of criteria to determine that the knowledge, skill or ability observed meets or exceeds, or does not meet, those criteria.

**Update** means the improvement or enhancement of an FSTD where it retains its existing qualification level.

**Upgrade** means the improvement or enhancement of an FSTD for the purpose of achieving a higher qualification level.

**Validation test** means a test by which FSTD parameters can be compared to the relevant data used to prove that the FSTD performance corresponds to that of the aeroplane or helicopter.

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## **CHAPTER 3      FLIGHT SIMULATION TRAINING DEVICE (FSTD) QUALIFICATION**

### **3.1      Introduction**

3.1.1 The DGCA differentiates between the technical criteria of the FSTD and its use for training / testing and checking. This Chapter contains the requirements to qualify the FSTD, subsequent to a request by an applicant, through initial and recurrent evaluations of the FSTD.

### **3.2      Qualification Criteria**

3.2.1 For initial FSTD qualification, the DGCA may conduct an evaluation of the FSTD in accordance with the requirements and criteria stipulated in ICAO Doc 9625 Volume I (Aeroplane) 3<sup>rd</sup> Edition/ Volume II (Helicopter) 1<sup>st</sup> Edition or as amended.

3.2.2 The qualification process to re-categorise an already qualified FSTD will be conducted as if it is an initial qualification of the FSTD, according to the requirements of this Chapter. The Summary Matrix of FSTD is attached in Appendix A.

### **3.3      Application for Initial Qualification of FSTD**

3.3.1 The applicant for the Certificate of Qualification for an FSTD shall submit an application in accordance with paragraph 3.3.2. The application process is contained in Annex B.

3.3.2 The FSTD operator who seeks an initial Certificate of Qualification for the FSTD must submit an analysis of the training tasks intended to be performed using the FSTD and the related simulation features including the level of fidelity required. The application must include the following information:

- (a) Completed CAAS Form (FO) 71 – Application Form for Certificate of Qualification of Flight Simulation Training Device (FSTD);
- (b) A description of the training tasks to be performed using the FSTD, with consideration to requirements relating to pilot licensing, qualification, rating and training;
- (c) An indication of the desired level of qualification in accordance with the FSTD Type of Device, or variation thereof, as indicated in Part I, Appendix B of ICAO Doc 9625 Volume 1 (Aeroplane) 3<sup>rd</sup> Edition or Volume II (Helicopter) 1<sup>st</sup> Edition, or as amended;
- (d) A training task matrix which compares each training task, differentiated on the basis of licensing or qualification requirements, against the suite of simulation features. Each simulation feature shall be defined as “Specific”, “Representative” or “Generic” level of fidelity, or if the feature is not required, indicate as “None”;
- (e) A statement that the FSTD has been thoroughly tested using a documented acceptance testing procedure covering cockpit layout, all simulated aeroplane or

helicopter systems and the Instructor Operating Station as well as the engineering facilities, motion, visual and other systems, as applicable. In addition a statement must be provided that the FSTD meets the criteria described in this SASP. The applicant must further certify that all the Qualification Test Guide (QTG) tests for the requested qualification level have been satisfactorily conducted;

- (f) A copy of the QTG to be used for the qualification of the FSTD;
- (g) The MQTG;
- (h) Documentation supporting Quality Management System and Configuration Management; and
- (i) Any other documents or records that support the application for the Certification of Qualification for the FSTD.

### **3.4 Notice period of an application for an initial qualification of a FSTD**

3.4.1 An FSTD operator who intends to apply for an initial qualification of an FSTD must:

- (a) notify CAAS Airworthiness/Flight Operations (A/FO) Division not less than 6 months prior to the planned evaluation; and
- (b) submit an application at least 3 months prior to the planned evaluation date.

### **3.5 Validity of FSTD Qualification**

3.5.1 The Certificate of Qualification for an FSTD is valid for up to 12 months from the date specified in the Certificate of Qualification.

3.5.2 The validity of the Certificate of Qualification for an FSTD is contingent upon the FSTD's continued compliance with the respective requirements and criteria used during its qualification.

3.5.3 The FSTD operator must advise the DGCA if the FSTD's continued compliance with the respective requirements and criteria cannot be maintained.

3.5.4 The DGCA may conduct special evaluations if there is reason to believe that the FSTD is not performing according to the requirements or criteria used during its qualification.

### **3.6 FSTD Qualification Evaluation Process**

3.6.1 The applicant for the Certificate of Qualification for an FSTD must submit a QTG that is acceptable to the DGCA. The evaluation of the FSTD will commence upon the DGCA's acceptance of the QTG.

3.6.2 The MQTG for the FSTD must be submitted for the DGCA's approval during the initial evaluation of an FSTD and the FSTD operator shall ensure that the FSTD continues to conform to the approved MQTG, as amended from time to time. This MQTG is the master document to which FSTD recurrent evaluation test results are compared. It may have to be re-established if any approved changes occur to the device, but should still be compliant with approved data.

3.6.3 The DGCA may conduct the following types of evaluations:

- (a) An initial evaluation is the first evaluation of an FSTD to the qualification level requested in the application. It consists of a technical review of the QTG and the necessary tests on the FSTD to ensure it meets all the requirements of this SASP;
- (b) Recurrent evaluations are those evaluations accomplished periodically to ensure that the FSTD continues to meet its qualification level;
- (c) Special evaluations are evaluations conducted under the following circumstances:
  - (i) a major hardware and/or software change has been made to the FSTD which may affect the handling qualities, performance or systems representations of the FSTD for which it was qualified;
  - (ii) the discovery of a situation that indicates the FSTD is not performing to the required standard;
  - (iii) moving an FSTD to a new location;
  - (iv) temporary deactivation of a currently qualified FSTD; or
  - (v) any other evaluation conducted at the DGCA's discretion.

Note: *Some of the above circumstances may require establishing revised tests leading to an amendment of the MQTG.*

3.6.4 During an initial evaluation, the applicant must provide technical and engineering support in the operation of the FSTD and a type-qualified instructor pilot.

### **3.7 Renewing the Certificate of Qualification for a FSTD**

3.7.1 An FSTD whose Certificate of Qualification is issued before 1 January 2016 continues to be valid until the expiry of that Certificate of Qualification. Thereafter, the FSTD operator may submit an application to renew the Certificate of Qualification, and ensure that the FSTD meets the requirements and criteria contained in ICAO Doc 9625 Volume I (Aeroplane) 3<sup>rd</sup> Edition or Volume II (Helicopter) 1<sup>st</sup> edition, or as amended.

3.7.2 Notwithstanding paragraph 3.7.1, a Certificate of Qualification issued to an FSTD operator by the DGCA prior to the promulgation of ICAO Doc 9625 Volume 1 (Aeroplane) 3<sup>rd</sup> Edition 2009 may be renewed upon a satisfactory evaluation conducted in accordance with the requirements and criteria stipulated in ICAO Doc 9625 Volume I (Aeroplane) 3<sup>rd</sup> Edition, or as amended, subject to the following conditions:

- (a) The FSTD Field-of-View (FOV), which does not meet ICAO Doc 9625 Volume 1 (Aeroplane) 3<sup>rd</sup> Edition or as amended, must be evaluated based on the initial qualification requirements for its subsequent renewal qualifications;
- (b) The FSTD Transport Delay, which does not meet ICAO Doc 9625 Volume 1 (Aeroplane) 3<sup>rd</sup> Edition or as amended, must be evaluated based on the initial qualification requirements for its subsequent renewal qualifications.

3.7.3 The DGCA may denote a symbol (G) in the Certificate of Qualification for a FSTD that is qualified under paragraph 3.7.2.

3.7.4 The FSTD operator who seeks to renew the Certificate of Qualification for the FSTD must submit an application that includes the following information:

- (a) Completed CAAS Form (FO) 71 – Application Form for Certificate of Qualification of Flight Simulation Training Device (FSTD);
- (b) QTG to be used for the qualification of the FSTD;
- (c) A statement confirming that the FSTD complies with the applicable criteria stated in the respective document used during initial qualification; and
- (d) Any other documents or records that support the renewal of the Certification of Qualification for the FSTD.

### **3.8 Notice period of an application to renew the qualification of an FSTD**

3.8.1 An application for a renewal of the Certificate of Qualification for an FSTD must be submitted not less than 60 days prior to the expiry of the Certificate of Qualification for the FSTD in order to provide for sufficient time for a recurrent evaluation of the FSTD to be conducted by CAAS.

### **3.9 Configuration Management System**

3.9.1 The FSTD operator must ensure that the FSTD continues to meet the respective requirements or criteria used during its initial qualification, or as otherwise stated in paragraph 3.9.2, and this includes the change of the FSTD’s hardware, software or specification from time to time.

3.9.2 To ensure the continued integrity of the hardware and software in accordance with the original qualification standard, or as amended or modified, the FSTD operator must establish and maintain a configuration management system and the associated processes. The configuration management processes must include an audit trail which clearly defines the simulation model changes “step-by-step” away from a fully flight-validated simulation model, so that it would be possible to remove the changes and return to the baseline (flight-validated) version.

### **3.10 Quality Management System**

3.10.1 The FSTD operator shall maintain the performance, functions and other characteristics of the FSTD to the category specified in the Certificate of Qualification of that FSTD.

3.10.2 A Quality Management System, acceptable to the DGCA, must be established and maintained by the FSTD operator to ensure the correct maintenance and performance of the FSTD.

3.10.3 The FSTD operator shall appoint a Quality Manager, acceptable to the DGCA, to ensure the compliance with the Quality Management and Configuration Management programmes.

### **3.11 Modification of a FSTD**

3.11.1 The FSTD operator shall inform the DGCA of any update or upgrade to the qualified FSTD.

- 3.11.2 An upgrade must not be made to a qualified FSTD unless the FSTD operator has obtained the approval from the DGCA to do so. The affected FSTD may be evaluated before an approval is granted. The DGCA may approve the upgrade upon a satisfactory evaluation of the FSTD and grant a new Certificate of Qualification.
- 3.11.3 To update a qualified FSTD, the DGCA may subject the change through a recurrent evaluation or special evaluation if deemed necessary by the DGCA, according to the applicable regulations in effect at the time of initial qualification.
- 3.11.4 In the event that such update would imply that the performance of the FSTD could no longer meet the requirements at the time of initial qualification, but that the result of the change would, in the opinion of the DGCA, clearly mean an improvement to the performance and training capabilities of the FSTD altogether, then the DGCA may accept the proposed change as an update while allowing the FSTD to retain its original qualification level.
- 3.11.5 Provided the qualification level of the FSTD does not change, all changes made to the FSTD must be considered as updates. An upgrade and consequent initial qualification according to latest regulations is only applicable when the operator requests a higher qualification level for the FSTD, and must be approved by the DGCA.

### **3.12 Installation**

- 3.12.1 The FSTD operator shall ensure that the FSTD is housed in a suitable environment that supports safe and reliable operation, and the installations comply with the regulations for health and safety. All FSTD occupants and maintenance personnel shall be briefed on FSTD safety to ensure that they are aware of all safety equipment and procedures in the FSTD in case of emergency.
- 3.12.2 The FSTD operator shall at least check annually the safety features such as emergency stops and emergency lighting and record such checks.

### **3.13 Moving an FSTD to a new location**

- 3.13.1 A Qualified FSTD must not be moved to a new location unless the operator has been issued with a new Certificate of Qualification.
- 3.13.2 The FSTD operator must notify the DGCA of an intention to move the Qualified FSTD to a new location not less than 3 months prior to the relocation.
- 3.13.2 The DGCA may grant the Certificate of Qualification on the FSTD after conducting a special evaluation to ensure that the FSTD performance continues to meet its original qualification standard. A copy of validation test documentation must be retained with the FSTD records for review by DGCA.

### **3.14 Temporary deactivation of a currently qualified FSTD**

- 3.14.1 In the event the FSTD operator plans to remove an FSTD from active status for prolonged periods, he must establish suitable controls for the period the FSTD is inactive, and that such controls are notified to the DGCA.
- 3.14.2 The FSTD operator shall notify the DGCA prior to reactivating an inactive FSTD back to service. The DGCA may conduct a special evaluation to ensure that the FSTD

performance meets its original qualification standard. The FSTD operator must retain a copy of the validation test documentation with the FSTD records.

### **3.15 Transfer of owner or operator of a qualified FSTD**

- 3.15.1 The FSTD operator must notify the DGCA in advance prior to the transfer of the FSTD to a new owner or operator.
- 3.15.2 The DGCA may subject the FSTD to an evaluation and the owner-to-be or operator-to-be, or both, to an audit that may include the Quality Management System and Configuration Management System.

## **CHAPTER 4      APPROVAL TO USE A QUALIFIED FLIGHT SIMULATION TRAINING DEVICE (FSTD)**

### **4.1      Application for an Approval to Use a qualified FSTD**

4.1.1 Pursuant to paragraph 20(12A) of the Air Navigation Order, a person who intends to use an FSTD for:

- (a) training and tests leading to a grant of a Singapore licence, or the grant or renewal of ratings associated with this licence; or
- (b) proficiencies training and checks associated with a holder of a Singapore Air Operator Certificate, an ATO or an owner of a Singapore-registered aircraft,

must:

- (i) ensure that the FSTD is a qualified FSTD; and
- (ii) apply to the DGCA for an Approval to Use that qualified FSTD.

4.1.2 The applicant for the Approval to Use a qualified FSTD shall submit an application in the form and manner that is acceptable to the DGCA. The application process is contained in Annex B, and the application must contain:

- (a) Completed CAAS Form FTSD 01 - Application for Approval to Use a Qualified Flight Simulation Training Device (FSTD);
- (b) the relevant segments of the approved training programme or the specific tasks, or both, to be conducted in the FSTD. For the avoidance of doubt, an approved training programme means an programme that is approved by the DGCA under the applicant's operations manual or training manuals, or both;
- (c) A gap analysis report containing the differences between the FSTD and the applicant's aircraft / equipment. The report must also include proposed mitigations to address the differences.
- (d) Any other documents or records that support the grant of an Approval to Use a qualified FSTD.

4.1.3 No application to use an unqualified FSTD shall be accepted by the DGCA.

### **4.2      Validity of the Approval to Use a qualified FSTD**

4.2.1 The Approval to Use a qualified FSTD is valid for up to 12 months.

4.4.2 An application for a renewal of the Approval to Use a qualified FTSD must be submitted not less than 60 days prior to the expiry of the Approval to Use a qualified FSTD in order to provide for sufficient time for a recurrent evaluation of the user to be conducted by CAAS.

4.4.3 The validity of the Approval to Use a qualified FSTD is contingent upon:

- (a) the continuing validity of the FSTD qualification; and
- (b) the holder of the Approval to Use a qualified FSTD complying with the limitations and conditions stated on the FSTD's Certificate of Qualification and the Approval to Use.

#### **4.3 Renewing the Approval to Use a qualified FSTD**

4.3.1 A user whose Approval to Use is issued before 1 January 2016 continues to be valid until the expiry of that Approval. Thereafter, the person may submit an application to renew the Approval to Use.

4.3.2 An applicant for the renewal of the Approval to Use must submit the documents stipulated in paragraph 4.1.2.

## APPENDIX A SUMMARY OF MATRIX OF FSTD QUALIFICATION VERSUS TRAINING TASKS

Licence or type of training	ICAO	FSTD	T/TP	Cockpit Layout and Structure	Flight model (Aero and engine)	Ground Handling	A/C Systems	Flight controls and forces	Sound Cue	Visual Cue	Motion Cue	Environment — ATC	Environment — Navigation	Environment — Weather	Environment — Aerodromes and Terrain
MPL4 — Advanced TR / ATPL Re RL / RO / IO / CQ	VII		T+TP	S	S	S	S	S	R	S	R	S	S	R	R
			TP	S	S	S	S	S	R	S	R	S	S	R	R
			T	S	S	S	S	S	R	S	R	N	S	R	R
			TP	S	S	S	S	S	R	S	R	S	S	R	R
MPL3 — Intermediate	VI		T+TP	R	R	R	R	R	S	R1	S	S	R	R	
TR / ATPL / RL / RO / IO	V		T	S	S	S	S	R	R	N	G	S	R	R	
MPL2- Basic	IV		T+TP	R	G	G	R	G	R	G	N	G	S	G	R
CR	III		T	R	R	R	R	R	G	R	N	N	S	G	G
IR	II		T	G	G	G	R	G	G	G	N	G	S	G	G
MPL1 — Core flying skills CPL PPL	I		T	R	R	R	R	R	G	R	N	N	S	G	G(S)
			T	R	R	R	R	R1	G	G	N	N	S	G	G
			T	R	R	R	R	R	R	G	R	N	N	S	G

<p>Training types:</p> <p>MPL1 Multi-crew Pilot Licence – Phase 1, Core flying skills;</p> <p>MPL2 Multi-crew Pilot Licence – Phase 2, Basic;</p> <p>MPL3 Multi-crew Pilot Licence – Phase 3, Intermediate;</p> <p>MPL4 Multi-crew Pilot Licence – Phase 4, Advanced;</p> <p>IR Initial Instrument Rating;</p> <p>PPL Private Pilot Licence;</p> <p>CPL Commercial Pilot Licence;</p> <p>TR Type Rating Training and Checking</p> <p>ATPL Airline Transport Pilot Licence or Certificate;</p> <p>CR Class Rating;</p> <p>RL Recurrent Licence Training and Checking;</p> <p>RO Recurrent Operator Training and Checking;</p> <p>IO Initial Operator Training and Checking;</p> <p>CQ Continuing Qualification; and</p> <p>Re Recency (Take-off and Landing).</p>	<p>Device feature fidelity level:</p> <p>S (Specific) Highest level of fidelity</p> <p>R (Representative) Intermediate level of fidelity</p> <p>G (Generic) Lowest level of fidelity</p> <p>N (None) Feature not required</p>
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## **Definitions**

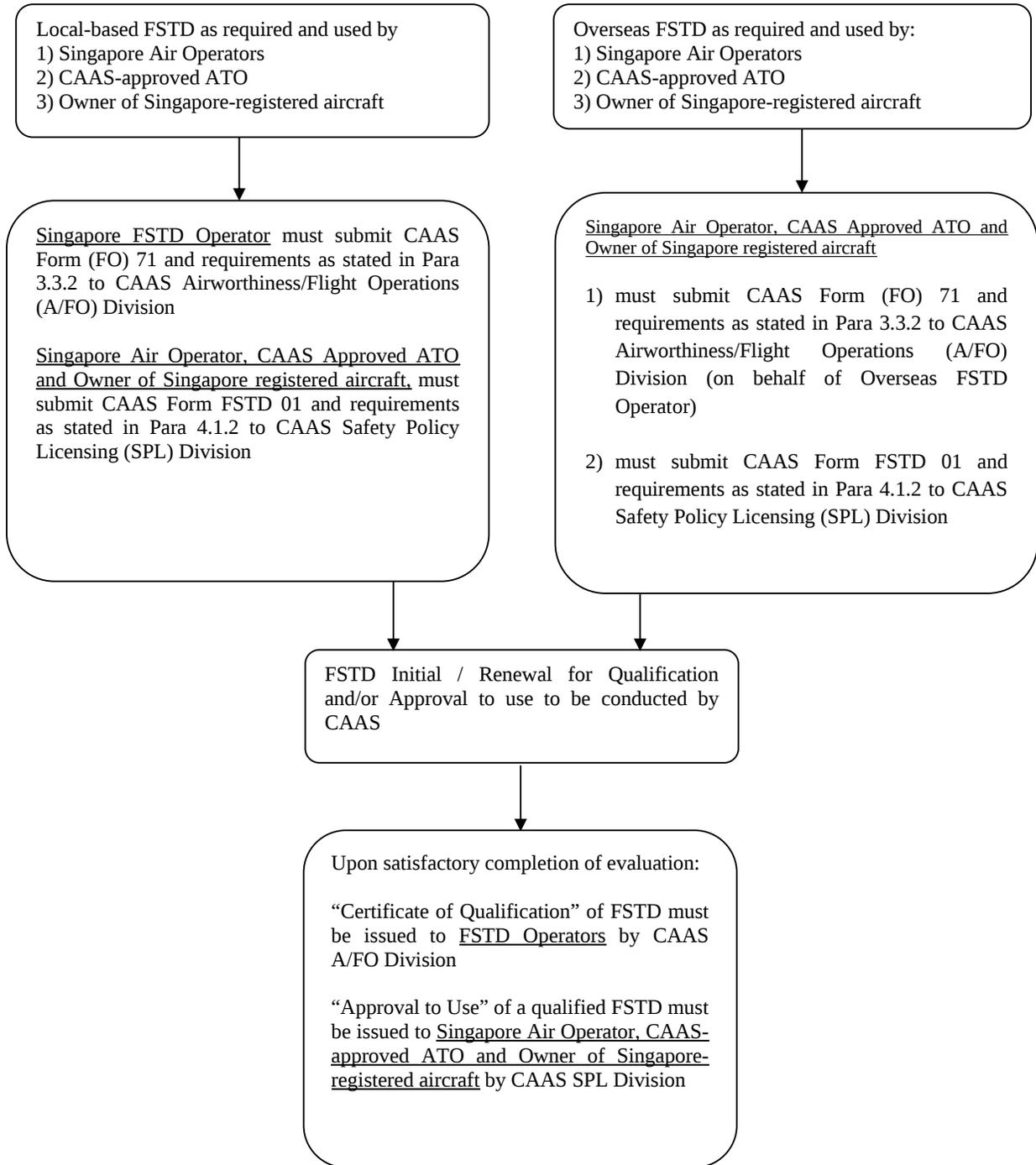
**Train (T)** – The introduction of a specific training task. The training accomplished may be credited towards the issuance of a license, rating or qualification, but the training would not be completed to proficiency. The fidelity level of one or more of the simulation features may not support training-to-proficiency.

**Train-to-proficiency (TP)** – The introduction, continuation or completion of a specific training task. The training accomplished may be credited towards proficiency and/or the issuance of a license, rating or qualification, and the training is completed to proficiency. The fidelity level of all simulation features supports training-to-proficiency.

## **Notes**

1. An FSTD with an initial Certificate of Qualification that was issued by the DGCA prior to the promulgation of ICAO Doc 9625 Volume 1 (Aeroplane) 3<sup>rd</sup> Edition 2009, and denoted with (G) in its Certificate of Qualification will be assessed for applicability for training tasks based on the associated Approval to Use of that FSTD previously issued.
2. Devices for MPL Phase 3. MPL Phase 3 learning outcomes are not specific to type. The Type VI FSTD example indicated in the summary matrix for MPL Phase 3 offers a means, but not the only means, by which the FSTD specifications support the training outcomes. The task analysis indicates the possibility to meet competency outcomes by a combination of training in the Type V and Type VII FSTD examples. The summary of the Type VI device example is deliberately “greyed out” to reflect the fact that the training community is at the time of publication uncertain about the optimal training device for this phase.
3. Devices for MPL Phase 4. MPL Phase 4 includes, but may not be limited to, an aeroplane type rating. An appropriate combination of device specifications to meet learning outcomes is indicated in the master matrix. The summary matrix however, requires training exclusively in a Type VII device, in compliance with ICAO Annex 1, Appendix 3, Paragraph 4.

**APPENDIX B APPLICATION PROCESS FOR FSTD QUALIFICATION AND APPROVAL TO USE A QUALIFIED FSTD**



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