สำนักงานการบินพลเรือนแห่งประเทศไทย
The Civil Aviation Authority of Thailand

ELECTRONIC FLIGHT BAG (EFB) APPROVAL GUIDELINES

CAAT-GL-OPS-EFB

Issue: 01

Revision: 00

Date: 1 OCT 2024

Approved by

Suttipong Kongpool

Director General of the Civil Aviation Authority of Thailand

Intentionally Left Blank

Foreword

The Electronic Flight Bag (EFB) is an on board electronic system in the cockpit, intended for the flight crew whose functionalities replace those traditionally fulfilled by the use of paper documentation such as navigation charts, operations manual, performance calculations. The EFB may also have additional functionalities, not fulfilled by paper documentation, such as displaying aircraft position on navigation charts.

The use of an EFB must not deteriorate the level of safety achieved with the use of paper documentation. The level of safety must be maintained or even improved. Thus, one of the key points of the system is the appointment of an EFB Administrator, responsible for the entire chain of production, updating and transmission of information. Another essential point is the realization of an operational risk assessment (EFB risk assessment). The operator shall demonstrate that the organisation and procedures implemented ensure that the use of the EFB system is robust, i.e. that they guarantee the accessibility, reliability and operability of the system. It will also need to be integrated into its compliance monitoring function.

According to their use, EFB applications can be classified in:

- Type A EFB application' means an EFB application whose malfunction or misuse has no safety effect; or
- Type B EFB application' means an EFB application :

  (a) whose malfunction or misuse is classified as minor failure condition or below; and

  (b) which neither replaces nor duplicates any system or functionality required by airworthiness regulations, airspace requirements, or operational rules.

Note: For more explanations on EFB applications classifications, see AMC1CAT.GEN.MPA. 141 (b)

This guideline introduces the requirements for CAT operators when using Type B EFB applications. Within this regulatory framework, the use of certain EFB applications in CAT operation is subject to approval by the CAAT.

Table of Contents

0 Introduction

0.1 Background

The CAT operators acquiring the Specific Approval (SPA) for the use of type B EFB applications must be in compliance with the requirements concerning initial and continuing airworthiness, operational procedures and training of all involved personnel. The process of approval includes the adoption of all parts of the operations manual system in the respective chapters as well as the amendment of affected maintenance documentation, procedures and tasks.

The evaluation of an EFB may have both, an airworthiness and an operational aspect. Therefore, a complete evaluation of an EFB system may be required.

The operator has to ensure that all parts of the operations manual system are revised in a manner as to be compliant with the requirements relevant for EFB operations. All initial and continuing airworthiness requirements must be fulfilled.

The following subjects must be covered:

- Evidence of the certification status of the affected aircraft has to be provided to CAAT (AFM, TC, SB, STC);
- Standard operating procedures (OM-A, OM-B), regional specific operational procedures and information (OM-C) as well as the training programmes (OM-D) must be defined and implemented in the OM System;
- Occurrence reporting procedures have to be established and described accordingly (OM-A, SMS).

0.2 Purpose

This guideline introduces the requirements for CAT operators when using EFB applications. Within TCAR OPS regulatory framework, the use of certain EFB applications in CAT operation is subject to approval by CAAT.

This guideline therefore applies mainly to CAT operators; however, it also sets out good practices that can be considered in the context of an NCC/NCO/SPO operation in order to meet the applicable requirements.

0.3 Applicability

CAT operator who seeking an EFB specific approval for using of Type B applications.

0.4 References

TCAR OPS Air Operation (Cover) Regulation and TCAR OPS Part, with the associated AMCs and GM including:

- **ORO – SUBPART GEN – GENERAL REQUIREMENTS**
    - ORO. GEN.200 Management System
- **ORO – SUBPART MLR – MANUALS, RECORDS AND RECORDS**
    - ORO. MLR.100 Operations Manual - General
- **ORO – SUBPART FC – FLIGHT CREW**
    - ORO. FC.230 Recurrent training and checking

- **CAT – SUBPART GEN – GENERAL REQUIREMENTS**
  - CAT. GEN. MPA.140 Portable electronic devices
- **CAT – SUBPART GEN – GENERAL REQUIREMENTS**
  - CAT. GEN. MPA.141 Using EFB
- **CAT – SUBPART GEN – GENERAL REQUIREMENTS**
  - CAT. GEN. MPA.180 Documents, manuals and information to be carried on board
- **SPA – SUBPART EFB – ELECTRONIC FLIGHT BAGS**
  - SPA. EFB.100 Use of EFBs - Operational approval
- **NCC – SUBPART GEN – GENERAL REQUIREMENTS**
  - NCC. GEN.131 Use of EFBs
- **NCO – SUBPART GEN – GENERAL REQUIREMENTS**
  - NCO. GEN.125 Use of EFBs
- **SPO – SUBPART GEN – GENERAL REQUIREMENTS**
  - SPO. GEN.131 Use of EFBs

1. General Principles

For an initial authorization to use an EFB and for any new supported type B application, the issuance process takes place in 3 steps: -

- Step 1: Submission of the application file to the CAAT;
- Step 2: Online operational evaluation phase;
- Step 3: Submission of the final operational trail report to the CAAT.

1.1 Step 1: Submission of the application file

An application for authorisation to use an EFB shall be supported by a data file containing the elements listed in Chapter 2. "Composition of the application file".

To process an application file, a compliance matrix is established in Chapter 3. Means of compliance. This matrix is accompanied by additional elements present in Chapter 7 "Explanatory Notes".

Following the review of the data submitted, the CAAT issues a temporary authorization (Notification Letter) to the operator to proceed with Phase 2 – Online Operational Evaluation Phase.

1.2 Step 2: Online operational assessment phase

The purpose of this phase is to enable the operator and the CAAT to ensure that operating in operation complies with the conditions for issuing the authorisation. It covers not only the evaluation in operational condition of EFB functions but also the administration process.

By default, the operational assessment consists of an online assessment lasting **6 months** with or without keeping paper documents on board the aircraft. It is subject to temporary authorisation from the CAAT. Specific feedback is required during this evaluation period.

If the operator does not wish to retain the paper version of EFB system functions, the operator must conduct an assessment of all operational procedures (normal, abnormal and emergency) during one or more simulator sessions (LOFT). During the evaluation phase, specific on-line inspections will be carried out by the CAAT/OPS FOIs, on the basis of a programme proposed by the operator.

This 6-month period can be reduced up to 3 months depending on the EFB experience of the operator. It can also be extended if the number of flights is not significant enough.

This assessment may be interrupted if the observations made by the operator or by the CAAT show that the actual use of the EFB in operation does not correspond to the conditions for issuing this temporary authorisation or degrades the safety of the operation. In this case, a new temporary authorisation may be issued on the basis of a proposal by the operator to amend the application dossier.

1.3 Final Report and Final Authorisation

At the conclusion of the online operational assessment, the operator provides a final report summarizing all the actions taken and means of compliance implemented as part of the application including the feedback received.

The final report covers the following points listed in AMC3 SPA.EFB.100(b):

- Crews are capable of correctly using EFB applications.

- Administrative procedures are in place and functioning correctly, especially the database update procedures.
- The introduction of the EFB does not negatively impact the operator's procedures, and alternative procedures in case of EFB loss are effective.
- The non-certified elements of the EFB system (hardware and software) have operated according to expectations.
- Assumptions made in the risk study are not contradicted.

All elements associated with the application document (including the safety assessment) are updated based on the results of this online operational evaluation.

Depending on the document provided by the operator, the following scenarios are considered:

- Issuance of a final authorization for the operation of the EFB system;
- Extension of the operational evaluation period for the EFB system;
- Refusal to issue authorization and closure of the file.

2. Composition of the Application File

The operator shall provide the CAAT with a document/file that includes:

- an application for approval containing a certificate of conformity drawn up by the person authorised by the operator;
- a demonstration of its compliance with all applicable regulation for the use of EFBs. It can be based on the compliance matrix set out in Chapter 3 "Means of Compliance" of this guideline. The operator can also use the checklists in APPENDIX 3: Checklists for the composition of application for approval to prepare his application file.

The expected content of its elements should be more detailed depending on the nature of the tool, the proposed applications and the framework of use. Examples:

- EFB all phases of flight;
- Type of function selected.

The elements of the file are referenced and categorised to facilitate reviewing and amendments.

3. Means of Compliance

This compliance matrix is intended to help the operator demonstrate regulatory compliance and guideline him in the development of the initial application file with the associated regulatory references.

Only the means of compliance with the requirements applicable to the applications that are the subject of the application for approval are expected.

The matrix is available in APPENDIX 2: Compliance Matrix.

Each item must be completed by the reference of the operations manual or other document.

The first part of the matrix lists additional requirements to those of the SPA. EFB.100. These requirements are mainly applicable to the computer hardware and mounting device, as parts of the EFB system used. The following table shows the structure of the TCAR OPS requirements applicable in the context of the introduction of a Type B EFB application.

Additional requirements to the SPA. EFB.100	
Technical requirements for the use of PEDs	AMC1 CAT. GEN. MPA.140
Use of EFBs - Hardware Aspects	AMC1 CAT. GEN. MPA.141(a)
Integration of EFBs into the compliance monitoring plan	AMC1 ORO. GEN.200(a)(2)
SPA. EFB.100 requirements	
Suitability of the Hardware used	AMC1 SPA. EFB.100(b)
Changes	AMC2 SPA. EFB.100(b)
EFB application under ETSO or other EASA assessment	AMC4 SPA. EFB.100(b)
Risk Assessment	AMC1 SPA. EFB.100(b)(1)
Human Factors and Human-Machine Interface (HMI) Considerations	AMC1 SPA. EFB.100(b)(2)
EFB Administrator (including policy & procedure manual)	AMC1 and AMC2 SPA. EFB.100(b)(3)
Procedures	AMC3 SPA. EFB.100(b)(3)
Flight Crew Training	AMC4 SPA. EFB.100(b)(3)
Specific requirements to a type of application	

Performance Calculation and Mass & Balance (W&B)	AMC 5 SPA. EFB.100(b)(3)
AMMD (Airport Moving Map Display) with aircraft position display	AMC 6 SPA. EFB.100(b)(3)
Using of commercial off-the-shelf (COTS) position sources	AMC 7 SPA. EFB.100(b)(3)
Navigation Chart display	AMC 8 SPA. EFB.100(b)(3)
In-flight weather display	AMC 9 SPA. EFB.100(b)(3)
Display of aircraft position in-flight	AMC 10 SPA. EFB.100(b)(3)

4. Explanatory Notes

This Chapter details the expected content of certain points in the application file.

Some EFB applications are subject to an OEB (Operational Evaluation Board) or OSD (Operational Suitability Data), or have received an ETSO qualification, carried out in coordination with EASA assessment process. This may cover a number of the points listed below. If the operator wishes to use these documents to support its application for authorisation, it will have to include the relevant elements in its application package, not only simply refer to it.

The use of Type B applications on an installed EFB falls within the scope of this application for authorisation.

4.1 Operational evaluation

4.1.1 Testing to support electromagnetic interfere and mounting device

Depending on the flight phases and the means of attachment chosen, certain tests are required as part of the operational evaluation of the equipment. This applies to portable EFBs since for installed EFBs all "airworthiness" requirements are addressed as part of the certification.

- EMI tests - electromagnetic interference

AMC1. CAT.GEN. MPA.140 details scenarios for using PEDs and the associated EMI tests, depending on the type of PED (T-PED or Unintentional transmitters).

According to the conditions of use of the EFBs, the operator shall conduct the required EMI tests and provide the conclusions thereof in the application dossier.

EFBs are classified as C-PEDs, the operator may use the alternative means defined in the same AMC in paragraph (d)(2). The checklist developed by the FAA can be used to respond to the test described in (d)(2)(i)(B). This test must be performed for each aircraft type / avionics architecture type.

https://drs.faa.gov/browse/excelExternalWindow/7F45E47EF7EE3A8A8625866500732A5C.0001

The report of this flight test and the checklist used are to be attached to the file.

- Batteries

This is to ensure that the batteries comply with AMC standards.

- Power supply

The operator shall ensure that the available source is suitable for its use by the EFB, that the independence of the sources is managed according to the number of EFBs used and their operational use.

If the operator wishes to recharge portable EFBs, it should ensure that these devices are not connected to essential electric buses. It also demonstrates that the EFB load does not disrupt the electricity grid in the event of a malfunction.

- Rapid decompression test

This test is required if EFB is used in flight. However, it can be replaced by an operational procedure that specifies the actions to be taken in the event of the loss of all EFB systems in the cockpit.

- Characteristics of screens/displays

This is to ensure that the brightness, legibility and manipulation (case of touch screens) of the information displayed on the screen are adequate to the needs and do not interfere with the aircraft functions. This

will have to be evaluated with the functions supported by the EFB. (see also Chapter 4.1.2 of the Guidelines)

- Connectivity aspect

Under certain conditions and depending on the certified capability of the aircraft, data transmissions between the EFB and avionics systems may be permitted. A vulnerability analysis as well as verifications and validation of the non-impact of these transmissions on the aircraft/helicopter systems will have to be carried out.

An EFB will only transmit information to avionics systems that have been certified for this purpose.

- Mounting device

It is recommended to use a certified mounting devices. However, it is possible to use devices (viewable stowage) that are not certified but will have to be evaluated operationally.

If the EFB is attached to a certified mounting device, the STC of the system shall be attached to the file. The operator shall demonstrate that the conditions of use and the limitations of the mounting device described in the STC have been considered and shall accordingly feed into his safety analysis/risk analysis (§4.1.4).

If the EFB is attached to a non-certified mounting system (viewable stowage) an operational evaluation will have to be carried out. The applicant must:

- clearly describe the characteristics of the viewable stowage system;
- provide the qualification tests carried out on the system; and
- the maintenance procedure to ensure the effectiveness of the platform system.

The evaluation carried out on a non-certified fastening system feed into the safety study/risk analysis in order to define the appropriate mitigations (§4.1.4).

The use of a mounting bracket during critical phases of flight does not prohibit pilots from using their EFB outside their platform system for a short period of time in order to perform a task related to flight safety, provided that it is continuously guarded. The EFB must then be stowed again. If this situation is envisaged, the operator will analyse this point in its risk analysis and establish appropriate instructions in its procedures.

Example of non-certified mounting systems (viewable stowage)	**Inconveniences**	**Solution**
Knee board	• Discomfort • Complicates the visual circuit - head down	• Solution considered if there is no room in the cockpit to install a fastening system. • Operational evaluation with an FOI • Access to features is easy • Does not interfere with the pilot when performing his tasks • Does not interfere with the aircraft evacuation • ...

Suction pad/cup	May degrade over time or under certain environmental conditions (exposure to solar radiation, temperature variation, humidity, pressure variation) • loss of adhesive capacity. If the system detaches (turbulence, special maneuvers ...), • may interfere with flight controls or injure the crew. • The location of the suction pad can be poorly chosen and obstruct the outside view	• Intrinsic characteristics of the suction pad • (Adherence indicator ?) • What "qualification" tests are carried out on the suction pad? • Crew procedures, maintenance, checks are put in place. • Ensure the correct location so that no discomfort is introduced if the system becomes detached. • The operator defines the appropriate location • (possibility to mark the location with a sticker for example)
Flight control/ Steering wheel platform system	• Represents a certain congestion (visual, discomfort of steering wheel travel, impact of turbulence on legibility) • The impact of a new mass on the flight control/control column is to be considered.	The operational assessment makes it possible to define the acceptability of the solution. (no discomfort on the visibility of the screens, accessibility of the flight controls). Data provided by the manufacturer makes it possible to analyse the impact of the EFB on flight controls.

4.1.2 Human factors assessment

The operator must conduct an assessment on the Human Machine Interface (HMI) and CRM aspects under the intended conditions of the use of EFB. This assessment shall cover the installation and integration of the system in the cockpit.

The operator should ensure that the EFB and the supported functions are properly integrated into the cockpit and do not contradict, among other things, the philosophy used for alarm management. The ergonomics of the applications must be sufficiently cognitive and not require too many resources from the crews. The operator may take into account an ergonomics examination carried out as part of an assessment carried out by EASA (e.g. OEB).

The human-machine interface of the applications used must be evaluated in comparison with the aircraft systems and the documents used by the flight crews in their flight preparation (flight records including flight plan, load sheet). In particular, the operator analyses the consistency between the headings, formats and units of mass handled by the flight crews. The findings will feed into the safety study/risk analysis (4.1.4).

If the EFB incorporates a function of weight and balance or performance calculation (take-off/landing/enroute), particular attention is paid to the evaluation and validation of this function in terms of human factors.

A review of the ergonomics of the function must be carried out to ensure that the risk of introducing error is limited. This review can be based on the checklist in APPENDIX 3: Check list of the file composition of the approval application.

4.1.3 Testing of Weight and Balance and Performance Applications

To validate the use of such an application, the operator should be able to prove its robustness and the accuracy/precision of the results provided.

First, the operator must have a document containing the specifications of the calculation software to ensure that the following are taken into account:

- AFM data;
- Regulatory requirements:
    - Safety factor, obstacle clearance margin, wind consideration (50% HW/150% TW), etc.
    - Operating margins, standard "crew" and "passenger" weights, etc.
- ...

1. If the application has been evaluated by EASA through OEB/OSD, the operator can rely on the published report, taking care to check the limits of the evaluation. In particular, the operator must ensure that the evaluation is applicable to the version used. For this it is necessary to examine the impact of the changes between the version used and that initially covered by the report.
2. If this is not the case, the evaluation should include a series of tests to validate the output of the application against the certified data from the aircraft flight manual (or equivalent certified document). The evaluation report describes the test method chosen by the operator (manual or automatic calculations, choice of the number and characteristics of the scenarios tested, etc.). The scenarios tested shall be representative of the operator's operations and in sufficient number to cover the boundary and operational scenarios. Any deviation from the certified data must be justified.

    a. <u>Particularities of the weight and balance applications determination.</u>

    The selected scenarios take into account the singular points of the operational envelope and the certified envelope. Other scenarios are to be tested on the operational envelope and also on representative points of the operation.

    - For mass calculation, the tests cover conditions for which limit masses are encountered. Further tests are to be expected for a loading rate of 70%.
    - For the determination of the CG, the tests cover cases of front and rear CG, at the limits of the certified and operational envelopes, with cases of maximum and typical loading. If the application determines trim configurations (depending on center of gravity, take-off weight, etc.), tests are conducted for front/rear and medium limit balances, and for low and maximum take-off weights. The trim configurations are then compared and validated according to the tolerances selected.

    If the application has the Mass and Balance limitations calculation functionality, then the results of the tests conducted on this feature are integrated into the evaluation report.

The operator ensures that the Mass and Balance limitation takes into account changes in mass and balance.

b. Particularities of performance calculation applications (take-off and landing)

APPENDIX 1: Validation of a Performance Calculation Application – Calculation Module provides guideline to the operator on the tests to be conducted for performance calculation applications.

The operator also verifies the OEI path calculations, in particular by ensuring the compliance of the take-off path and compliance with the regulatory obstacle margins.

To complete this evaluation and to validate the robustness of the software, tests may be requested during the online operational evaluation phase under real operating conditions. The results from the old method and those from the new method are then compared. The operator formalises in its online operational evaluation end-of-phase report (see §2) the frequency of the tests conducted and the conclusions.

Finally, the testing carried out by the operator as well as the integration of the terrain database are subject to specific tests in order to verify the results obtained. These tests can be covered through the validation of an application without OEB/OSD in 2.b) of §4.1.3. The volume of tests depends on the extent of the configuration performed by the operator.

4.1.4 A safety risk assessment/analysis

An analysis of operational risks has to be conducted. This change management is part of the operator's safety management system (ORO. GEN.200). The safety risk assessment shall be conducted according to the operator's method as defined in its management system. These are:

- Identify and assess the risks associated with the use
  - of EFB as a whole.
  - of each Type B application.
- If necessary, to define and implement mitigating measures to reduce risks to an acceptable level.

The operator shall ensure that the risks of total loss of the EFB system, partial loss of EFB applications, as well as the display of erroneous data have been assessed and that appropriate risk mitigation measures have been put in place.

As an example, here are some contributors related to the risks of displaying erroneous data:

- Inserting an error when creating the database
- Incorrect input insertion (due to HMI defect)
- Erroneous result due to application interaction
- Use of data from the previous flight
- Automatic modification of input data (e.g. following optimization)

The mitigation measures taken as part of the risk analysis may have an impact on flight crew training, the procedures to be put in place, the administrator's manual and the data to be monitored.

The risk analysis is initially based on the operational assessment on the ground and, where appropriate, on existing work on the subject (OEB, OSD,...). It is then deepened during the online operational assessment, and updated according to changes in the operating framework, and feedback (ASR or Commander report), to ensure that the risks identified have not evolved negatively and the actions put in place remain effective.

If the operator relies on a risk study developed by the developer of the application, the operator must ensure that the operational environment in which the study takes place is considered.

Concerning to the use of performance computing applications, EASA published SIB 2016-02 to communicate on the risk of using incorrect parameters. EASA gives recommendations on how to take this risk into account in the safety study, the points to be addressed in training, as well as on the company's flight data analysis process.

Risk related to Lithium batteries

The installation of an EFB in a cockpit induces a new risk. During the certification of an installed EFB, this risk was assessed and found to be acceptable. The risk associated with portable EFBs must be taken into account by the operator.

The portable EFB is considered as a C-PED in accordance with the CAT. GEN. MPA140 and must meet the requirements of this paragraph for Lithium batteries. To comply with the CAT. GEN. MPA.140, operator should put in place the procedure to prevent thermal runaway of batteries, the emergency procedure for portable electronic systems (PED) battery fire that also applies to portable EFBs.

This should be considered as a prerequisite for the issuance of the provisional authorisation for online operational evaluation.

The operator should consider to provide the kits/emergency equipment (gloves and bag) to control possible overheating or lithium battery fires.

To minimize the risk of overheating, the operator also ensures that if the EFB charging is considered during the flight, it is done with cables and peripherals recommended by the EFB manufacturer

4.2 Amendments to the operator's documentation

4.2.1 Crew procedures

The operations manual is amended to cover:

- checking of updates, EFB applications, databases;
- the procedure for using the EFB (normal, abnormal and emergency procedures);
- task-sharing among flight crew members.

The EFB functional and scope of use (the functions used and the phases of flight for which they are used) should be described in the Normal procedures. There is also the configuration of the EFB that pilots must check (Airplane mode, deactivation of Wifi, bluetooth for example), verification that the data is up to date and that the percentage of battery power is acceptable (in the event that no in-flight power supply is provided). The use of one or more EFBs is governed by a tasks sharing to be developed by the operator.

If performance calculation applications (e.g. take-off/landing, weight and balance) are supported by the EFB, the procedures are supplemented by the provisions present in paragraph (c) of the AMC5 SPA. EFB.100(b)(3). In particular, the operator should develop a procedure for cross-checking the results of calculations carried out independently by the pilots. This cross-check also incorporates output data from another aircraft system.

It also develops a procedure for detecting “gross errors” in the calculation (e.g. consistency checks of reference speeds resulting from the use of another calculation source in the aircraft or a manufacturer's document).

Abnormal procedures include crew procedures in the event of loss of one or more of the functions supported by the EFB.

Emergency procedures may include the procedure in case of thermal runaway and battery fire of EFBs (see. §4.1.4).

4.2.2 Dispatch conditions / limitations

The case of total or partial failure of the EFB is to be considered, alternative procedures are to be put in place.

The minimum recommended configuration is 2 EFBs per aircraft. This makes it possible to cover the case of simple failure and reduces exposure to the risk of total loss of the supported function.

- If the EFB is installed, the associated failures are managed via the MEL.
- If the EFB is portable but remains permanently in the aircraft, failure management via the MEL or via a "Limitations" part of the operations manual may be considered. In the latter case, since the equipment can be considered as part of the aircraft to some extent, it is possible to insert an EFB item in the MEL that would refer to the paragraph "Limitations" and in which the dispatch conditions would be found.
- If the EFB is not attached to the aircraft (case of the EFB assigned to the pilot permanently or temporarily), failure management via a "Limitations" paragraph of the operations manual is recommended.

In cases where EFB management would not involve the maintenance department, a procedure should be put in place to ensure that the unavailability of the function is managed and limited so that flights taking place in a degraded configuration (number of operational EFBs on board less than the configuration defined by the operator) are limited. In this case, it is recommended in this case that this is subject to a recorded procedure in the administration manual. All failures are reported to the administrator so that the function will not unserviceable for more than a specific duration (10 days maximum recommended according to the CS-MMEL) or a limited number of flights.

The operator then provides a sufficient number of standby EFBs to ensure that each departure from the base is non-degraded (e.g. with all EFBs planned for flight, operational and up to date).

4.2.3 Flight Crew Training

Flight Crews should receive training in the use of the EFB prior to the operational use of the EFB (including during the online operational assessment phase).

This training should cover the use of the system and applications, normal, abnormal and emergency procedures, flight phases for which the EFB can or cannot be used, checks to be done, segregation of duties (if applicable).

The use of a simulator is recommended.

If the operational procedures depend on the use of an EFB, which is the case when a Type B function is installed in the EFB. The simulators used for periodic training and testing must incorporate (one or more depending on the applications chosen) EFB representative of that used in flight.

The training shall provide that, a troubleshooting on the system failure shall not be considered in the event of a malfunction of the EFB.

4.2.4 EFB administration and policy

This part is particularly essential for the proper implementation of EFB systems. This involves monitoring the operator's EFB hardware as well as the EFB applications and the data used by these applications.

Role of the administrator

The EFB Administrator is a person designated by the operator, who is responsible for the administration of the EFB system. Several people may be involved in the EFB administration process. However, only one person is designated as EFB Administrator, responsible for the system, coordination with Authority. He supervises the entire administration process and ensures that each platform is updated. It is the essential link between the operator and the suppliers of the EFB system (hardware and software).

Administrator's responsibility:

In particular, it to ensures:

- the hardware selected for the operator complies with the required specifications;
- no unauthorized software applications are installed on the platform;
- updates application versions and data used by applications;
- all installed applications and support provided to EFB users;
- the management of safety related aspects of the application;
- the integrity of the data used by the installed applications;
- the management of EFB hardware and software configuration.

Administrator Training

All persons involved in the administration of the EFB should obtain appropriate training and have a working knowledge of both the hardware, operating system, and relevant software applications. The content of this training is normally defined in partnership with the EFB system or application provider.

The "training" aspects are particularly essential. The operator must ensure the continuity of the competence required for each of the persons involved in the Administration process. This means, for example, in case of replacement of the Administrator, appropriate training on the administration of the EFB system is delivered to his successor prior the previous Administrator leaves.

Security aspects

The operator must establish the barriers to prevent unauthorized intrusion. Depending on the criticality of the application, the level of protection to be implemented at the level of the system or administration procedures is more or less important.

For example, in the case of performance calculation applications supported by EFB, the configuration of EFBs should be blocked to avoid interaction with unauthorized applications, or EFB should be clearly partitioned and the various (non EFB) applications segregated from EFB applications.

EFB Procedures Manual (Administration Manual)

This manual should contain the procedures related to the EFBs management by the operator. It includes:

- identification type of the EFB(s) used by the operator;
- EFB management rules (attached to the aircraft or pilot);
- a description of the EFB parts that can be modified by the operator (the administrator);
- the applications authorised by the operator and the versions in force;
- the management of the specificities related to the different aircraft in the fleet;

- procedures for updating the EFB (platform, operating system), applications, and data used by applications;
- security procedures (accessibility, protection);
- procedures to prevent data and application corruption;
- Etc.

Depending on the size of the operation and the number of EFBs deployed, tools are available to manage mobile devices (MDM-Mobile device management) and thus facilitate the administration of EFBs.

This type of tool allows:

- The updates management of hardware and their applications;
- Remote control of hardware (e.g. Remotely allowing or preventing application downloading, remotely blocking and erasing data,...).

A dedicated part concerning the management and processing of databases is to be developed in this manual according to the type of data. Depending on the criticality of the data types (e.g. obstacle data), the following elements are specified:

- Required staff skills to process the data;
- Policy and procedures for detecting data errors;
- Process to ensure data integrity during the cycle generate/distribute/use.

4.2.5 Compliance monitoring

EFB aspects are taken into account by the compliance monitoring function in accordance with the ORO. GEN.200. As such, internal quality controls are carried out to ensure that controls involved in the administration and use of the EFB comply with the defined procedures.

4.2.6 Change management/updates

Changes may occur in the EFB system. Any changes must be conducted in accordance with the change management procedure approved by the CAAT. A change that:

- does not change the calculation algorithm of a Type B application;
- does not makes a change to the HMI of a Type B application that requires a change in pilot training or procedures, does not introduce new functionality on a Type B application;
- introduces a new Type A application or modifies an existing one;
- updates the database of a Type B application.

can be introduced without CAAT approval.

Any changes will have to be subject to formalized tests to ensure the proper functioning of the system after updating.

It is recommended that the operator develop notes for crews to inform them of the scope of updates.

APPENDIX 1: Validation of a Performance Computing Application - Module Calculation

The tables below present typical scenarios to be tested when no EASA evaluation cover a performance and mass and balance calculation application.

Take-off:

Weather Conditions	Slat/Flaps	Engine	Engine Bleeds	Wind
Case:1				
Max T° / Zp Certified	All configurations	Maximum Thrust	- Bleeds on - Bleeds off	- Max Tailwind - Zero - 20 kts headwind
Case:2				
STD atmosphere (15 °C/sea level)	All configurations	- TOGA - De-rated/FLEX	- Bleeds on	- Max Tailwind - Zero - 20 kts headwind
Case:3				
Min T° / Zp	All configurations	- TOGA - De-rated/FLEX (if applicable)	- Bleeds on	- Max Tailwind - Zero - 20 kts headwind

For each case, the tests are to be distributed:

- on the most "critical" airports (e.g. with limiting obstacles in the take-off path) of the operator's network; and
- with the following runway types: runways with certified min/max slope and zero slope.

For the 1st and 2nd case, the tests are also to be distributed with dry/wet/contaminated runway conditions. For the 3rd case all dry/wet/contaminated runway conditions must be tested.

Among the previous scenarios, additional tests are to be expected in conditions of item failures (MEL) having an impact on the performance of the aircraft.

Finally, additional tests are necessary depending on the particularities of the operator's operations (e.g. steep take-off gradient procedure, short runway).

Landing:

Additional tests are to be conducted if the operator is approved for steep slope approaches.

Weather Conditions	Slat/Flaps	Engine	Engine Bleeds	Wind

Case:1

STD atmosphere (15 °C/sea level)	All configurations	Two reverse thrust	Combine Max autobrake with MLW	- Max Tailwind - Zero - 20 kts headwind

Case:2

Min T° / Zp Certified	All configurations	- TOGA - De-rated/FLEX (if applicable)	- Bleeds on	- Max Tailwind - Zero - 20 kts headwind

For each case, the tests are to be distributed:

- on the most "critical" airports of the operator's network;
- with the following types of runways: runways with certified min/max slope and zero slope;
- with the following runway conditions: dry/wet/contaminated runway; and
- with increments on approach speed.

APPENDIX 2: Compliance Matrix

Compliance Matrix			
Title	**Reference/Regulation**	**Means of Compliance**	**§ of this guideline**
Portable electronic device (Additional requirements to the SPA. EFB)			
EMI Test	AMC1 CAT. GEN. MPA.140 (c) and (d)		4.1.11
Batteries	AMC1 CAT. GEN. MPA.140 (f)		4.1.1.2
Screen/Display Features	AMC1 CAT. GEN. MPA.141(a) (b)		4.1.1.5
Power source	AMC1 CAT. GEN. MPA.141(a) (c)		4.1.1.3
Connectivity	AMC1 CAT. GEN. MPA.141(a) (d)		4.1.1.6
External connection cables (to aircraft systems or power supply)	AMC1 CAT. GEN. MPA.141(a) (e)		
Viewable stowage	AMC1 CAT. GEN. MPA.141(a) (h)		4.1.1.7
Suitability of the Hardware used			
Screen position: - Avoid increased workload and head-down movements; - In the pilot's viewing angle.	AMC1 SPA. EFB.100(b), (a)		
Screen features: - Degradation over time to be considered; - Legibility in all conditions of use (including direct lighting by the sun;	AMC1 SPA. EFB.100(b), (b)		

- Ability to adjust brightness (independent of other screens in the cockpit); - Possibility of illuminating the control buttons; - Indication, of the function of the control buttons, if necessary.			
Power sources: - Consider the need for power source independence and the need for an external battery see AMC1 CAT. GEN. MPA.140	AMC1 SPA. EFB.100(b), (c)		
Environmental testing: - Rapid decompression tests (pressurized aircraft) or reliability tests at maximum operating altitude (non-pressurized aircraft); otherwise, alternative procedures; - Evaluation under turbulent conditions.	AMC1 SPA. EFB.100(b), (d)		4.1.1.4
Changes			
Change management procedure indicating cases: - Not requiring authority approval; - Requiring the use of the operator's approved change management procedure.	AMC2 SPA. EFB.100(b)		4.2.6

EFB application under ETSO or other EASA assessment			
Case of an application under ETSO: consideration for operational and installation instructions and limitations	AMC4 SPA. EFB.100(b)		
Consideration for an EASA assessment (e.g. OEB)	GM2 SPA. EFB.100(b)		4.1.4
Risk Assessment			
Risk assessment covering hardware and each supported Type B application	AMC1 SPA. EFB.100(b)(1) (a)		
For each application, assessment of: - Erroneous output data not detected (considering contributors such as data corruption, EFB administration, insertion of erroneous input data); - Loss of the application.	AMC1 SPA. EFB.100(b)(1) (b)		4.1.4
When using developer risk analysis, consideration of the specific operational environment under consideration.	AMC1 SPA. EFB.100(b)(1) (a)		
Human Factors and Human-Machine Interface Considerations			
Evaluation of: - the HMI; - installation; and - CRM aspects. Identification of mitigation means to:	AMC1 SPA. EFB.100(b)(2) (a)		4.1.2

- Reduce the risk of error insertion; - control the additional workload associated with the use of the EFB.			
Evaluation covering: - Homogeneity: ○ of EFB application interfaces between them, ○ of the EFB system in the cockpit. - input peripheral and input data entry areas; - messages and the use of colours; - system error messages (including input data format verification systems); - system failure states; - application responsiveness; - Out-of-scope data content; - Management of multiple applications in operation.	AMC1 SPA. EFB.100(b)(2) (b)		
EFB Administrator			
Appointment of an EFB administrator	AMC1 SPA. EFB.100(b)(3)		4.2.4
Responsibilities of the EFB Administrator: - provide support to users of installed EFB applications;	AMC1 SPA. EFB.100(b)(3)		4.2.4

- Check for potential IT security hazards; - Manage EFB software and hardware configuration; - Ensure that only valid versions of applications and databases are installed; - Ensure the integrity of EFB application databases.			
Administration Manual containing: - Procedures for updating databases and applications, including Means of ensuring integrity; - Identification of which parts of the EFB are the responsibility of the operator and which are only accessible by the application provider.	AMC2 SPA. EFB.100(b)(3)		4.2.4
Procedures			
Procedures for Using Type B Applications	AMC3 ORO. MLR.100 (OM-A, 8.9)		
In case of EFB data similar to data from certified systems, identification of the primary means and the actions to be taken in case of difference.	AMC3 SPA. EFB.100(b)(3), (a)		4.2.1
How to verify the EFB configuration, including application and database versions.	AMC3 SPA. EFB.100(b)(3), (b)		4.2.1

What to do in case of an out-of-date application or database			
Workload reduction and management procedure	AMC3 SPA. EFB.100(b)(3), (c)		
Dispatch procedures and conditions	AMC3 SPA. EFB.100(b)(3), (d)		4.2.2
Maintenance and overhaul Checking battery period	AMC3 SPA. EFB.100(b)(3), (e)		
IT security	AMC3 SPA. EFB.100(b)(3), (f)		
Electronic signature	AMC3 SPA. EFB.100(b)(3), (g)		
Training			
Specific points to be addressed during the training	AMC4 SPA. EFB.100(b)(3), (a) and (b)(3)		4.2.3
Performance and Weight & Balance Application			
Application based on AFM or performance manual data (without extrapolation)	AMC 5 SPA. EFB.100(b)(3)		
Application in accordance with CAT.POL requirements.	AMC 5 SPA. EFB.100(b)(3)		
Demonstration of application reliability and accuracy	AMC 5 SPA. EFB.100(b)(3)		See Annex 1
Verifying the integrity of databases by the application before performing calculations	AMC 5 SPA. EFB.100(b)(3)		
Identifying the application version	AMC 5 SPA. EFB.100(b)(3)		
Compatibility between the application and the EFB system	AMC 5 SPA. EFB.100(b)(3)		
Backup of calculations performed (inputs and outputs)	AMC 5 SPA. EFB.100(b)(3)		

and data conservation for at least three months			
If applicable, definition of new staff tasks (pilot, dispatcher, ...)	AMC 5 SPA. EFB.100(b)(3)		
Pilot procedures: - Independent calculations; - Cross-check between EFBs and with data from another aircraft system – "Gross-error check".	AMC 5 SPA. EFB.100(b)(3)		
Training: - Importance of SOPs to ensure completely independent calculations; - Specificities if different calculation options available (e.g. dispatch/in-flight for landing performance); - Identification of default values; - The calculation assumptions used by the application.	AMC 5 SPA. EFB.100(b)(3)		
HMI Evaluation	AMC 5 SPA. EFB.100(b)(3)		Appendix 3
For W&B applications, mass display and associated GC on a diagram	AMC 5 SPA. EFB.100(b)(3)		
AMMD applications with aircraft position display			
Use of the application as secondary means Instruction indicating that the primary means remains observation from the outside	AMC 6 SPA. EFB.100(b)(3), (a) and (e)		

Demonstration of compliance with ETSO-C165a criteria	AMC 6 SPA. EFB.100(b)(3), (b)		
Consider installation instructions provided by the application developer and any known limitations or issues: - Identification of compatible EFB systems; - Installation procedure and limitations on each system; - Description of the interface including requirements on input devices; - Means to ensure that the AMDD is well installed.	AMC 6 SPA. EFB.100(b)(3), (b) and (d)		
Training	AMC 6 SPA. EFB.100(b)(3), (f)		
Using Non-certified commercial off-the-shelf (COTS) position source			
Reserved			
Navigations Chart Application			
Information (content and form)	AMC 8 SPA. EFB.100(b)(3)		
Size, resolution, and position of display			
In-Flight Weather Application			
Application usage framework and instructions for use: - Strategic decision-making;	AMC 8 SPA. EFB.100(b)(3), (a)		

- Not a substitute for weather radar or flight record information.			
Certified weather service providers (or other sources evaluated by the operator)	AMC 8 SPA. EFB.100(b)(3), (a)		
If applicable, consistency with information used by the operator's operations control center.	AMC 8 SPA. EFB.100(b)(3), (a)		
Information display	AMC 8 SPA. EFB.100(b)(3), (b)		
Training and procedures	AMC 8 SPA. EFB.100(b)(3), (c)		
Application Displaying Own-Ship Position in-flight			
Reserved			
Compliance Monitoring			
Integration of EFBs into the compliance monitoring plan	AMC1 ORO. GEN.200(a)(2)		4.2.5

APPENDIX 3: Checklist of Data to be Submitted for EFB Approval

The following checklists have been developed based on the requirements applicable to EFBs and constitute a synthesis of points of attention and good practice in an EFB application filer.

These checklists are a development of the regulatory requirements to guideline the operator in demonstrating its compliance. It is therefore acceptable for the operator to answer "Yes" to some questions if they are able to demonstrate compliance with regulatory requirements.

Through a questioning system, these checklists will allow an operator to optimize his application for EFB approval and to identify the supporting documents necessary for the assessment of the data by the CAAT.

Finally, these checklists do not replace the compliance matrix but can make it possible to answer to certain points.

01 - TECHNICAL DESCRIPTION OF THE SUPPORT (TO BE COMPLETED FOR EACH TYPE OF EFB)

1. Electronic device identification:

Name

Click or tap here to enter text.

Provide relevant excerpts from the operations manual describing the selected electronic device.

Is the EFB:	☐ portable ☐ installed
If the EFB is portable, is it part of the aircraft equipment?	☐ Yes ☐ No

2. Identification of supported applications:
   - Operator Documentation;
   - Navigation charts;
   - Performance Calculation;
   - W&B calculation;
   - Electronic flight Log/record;
   - In-flight weather;
   - Electronic OFP;
   - Other:

Provide relevant extracts from the operations manual describing the supported EFB applications and their use.

3. Identification of the means of attachment (if applicable):

Name

Click or tap here to enter text.

Provide relevant extracts from the operations manual describing the platform system selected.

Has he mounting device been certified?	☐ Yes ☐ No ☐ N/A

02 -TESTS OF THE ELECTRONIC SUPPORT (TO BE SUPPLIED ONLY IF THE EFB IS PORTABLE)

1. Electromagnetic interference (EMI) tests:

Is the EFB only used during the cruise or not used during the flight (e.g. only flight preparation)?	☐ Yes ☐ No

- *Provide relevant extracts from the operations manual.*
- *If no (use of EFB during critical phases of flight), provide EMI tests (see §4.1.1)*

2. Batteries:

Do EFB batteries comply with the standard: **UN ST/SG/AC.10/11/Rev.5-2009**	☐ Yes ☐ No
Do the batteries also comply with one of the following standards: ○ UL 1642, ○ UL 2054, ○ UL 60950-1, (Note: UL 2054 compliance implies UL 1642 compliance) ○ IEC 62133 ○ RTCA/DO-311 ○ ETSO C142a	

Provide the necessary supporting documents.

3. Power supply on aircraft (if applicable):

Is there another way to turn off the power source?	☐ Yes ☐ No
Is the power source suitable for EFB?	☐ Yes ☐ No
The power supply is through a non-essential (non-critical) electric bus.	☐ Yes ☐ No
Has an electrical load analysis (ELA) been conducted to ensure that the power supply does not damage the aircraft systems?	☐ Yes ☐ No
Is there an indication of the characteristics of the power supply next to the power supply output? (Voltage, frequency, etc.)	☐ Yes ☐ No
Can the power source be turned off at any time?	☐ Yes ☐ No
The power cable path does not present an operational risk (interference with flight controls, emergency equipment, cable length, etc.) ?	☐ Yes ☐ No

4. Environmental testing:

Is the aircraft operating above 10 000ft and is the EFB used in flight?	☐ Yes ☐ No

- *If yes, provide the EFB decompression tests or the appropriate operating procedure (see §4.1.1).*

Is the aircraft subject to specific environmental conditions (extreme cold, sandy environment, humidity, etc.)?	☐ Yes ☐ No
If Yes, have additional tests been conducted to ensure that it functions properly under these conditions?	☐ Yes ☐ No

- *If yes, provide the testing evidence, documentations.*
- *If not, provide the justifications to avoid these tests.*

5. Connectivity:

This aspect is not covered by the C/L for portable EFBs.