GUIDANCE TO OPERATORS – OPERATING APPROVALS AND RENEWALS
REVISION HISTORY

Edition 1    April 2016

Initial issue

Amendment 1    July 2016

Update Legislation references

Amendment 2    January 2017

Introduction of NAT HLA

Amendment 3    3 May 2017

Introduction of RNP 2

Amendment 4    17 May 2017

Remove Category specific RVR Minima for LVTO following introduction of lower than 150m RVR available to Cat D aircraft.

Amendment 5    27 November 2017

Enhancement to 3.7 RNP APCH following withdrawal of Form 50 RNP APCH Checklist and Declaration.

Introduction of RNP AR APCH.

Transfer of information previously included in RP6 - Minimum Equipment List (MEL) Preparation Guide into RP4 5.1 & 5.2.

Transfer of information previously included in RP35 - Application for Approval and Safe Operational Use of Electronic Flight Bags (EFB) into RP4 5.3 Electronic Flight Bag (EFB).

Amendment 6    3 January 2018

Amendment to 6.2.5 Enhanced Vision System / Head Up Display (EVS/HUD). The note previously stated that ‘the EVS/HUD Exemption will not be included on the Operations Specification Certificate.’ This has been amended to state that ‘the EVS/HUD Exemption will be referenced on the Operations Specification Certificate.’

Amendment 7    26 March 2018

RNP AR APCH Training Requirements

Introduction of FANS 1/A + (PBCS)
Editorial changes to 5.2 Minimum Equipment List

Amendment to EFB definition (i.e. when a PED becomes an EFB) and guidance on Compliance with AD/STC AFM amendments on an EFB.

Amendment 8  29 November 2018

2.1.3 RVSM Height Monitoring Requirements – new paragraph.

Chapter 3 & 4
- References to ‘ATN B1 CPDLC’ changed to ‘ATN B1’ to match ICAO definitions.

Chapter 5.2 MEL
- Adjust timescales for MEL submissions following revision to MMEL;
- Clarify MEL is responsibility of FOR;
- New paragraph to provide guidance to operators affected by other civil aviation legislation (e.g. Part-NCC);
- Other editorial changes based on feedback from operators;
- Clarification that operators are strongly encouraged to use the Preamble in Appendix 1 (or 2 if applicable); and
- Removal of Appendix 3 – Flow Diagram for preparing an MEL, Appendix 4 – FAQs and Appendix 5 – Common Items Encountered During an MEL Assessment (these have been replaced with Registry Leaflet 1 – MEL Preparation Guide).

Chapter 5.3 EFB
- Introduce revised categories of EFB – Portable and Installed (replacing old Class 1, 2 & 3);
- Update EFB guidance to reflect latest ICAO Doc 10020 EFB Manual;
- Introduction of EFB definitions, including ‘critical phase of flight’.

Amendment 9  04 April 2019

Chapter 2.1 RVSM
- 2.1.3 RVSM Height Monitoring Requirements – update to height monitoring requirements and where guidance can be found prior to receiving RVSM approval.

Chapter 3 PBN
- Inclusion of the Acceptable Means of Compliance for PBN Approval for each type of PBN approval issued by the IOMAR.

Chapter 5.2 MEL
- Enhancement to MEL Preparation & IOMAR Standards requirements
- Requirements for operators affected by EASA Part-NCC.
- Changes to MEL Amendment requirements.
- Enhancements to MEL Definitions required in the Preamble.
Chapter 3 PBN

- Chapter 3.7 & 3.8 updated to include alternative nomenclature for RNP APCH ie 'RNAV (GNSS)', and RNP AR APCH ie 'RNAV (RNP)'.
- Chapter 3.8.8.1 Application Form - sentence deleted as FCL validations are no longer re-issued to include operational privileges.
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Chapter 1: General

This Registry Publication (RP) contains details of the operational approvals available to operators of ‘M’ registered aircraft and that require approval from the Isle of Man Aircraft Registry (IOMAR).

1.1 Application Process

Form 4 should be used to request initial operating approvals for ‘M’ registered aircraft.

Form 4a should be used to request renewals of operating approvals for ‘M’ registered aircraft.

Form 4 and 4a include links to the relevant Registry Publications (RP) and additional application forms (where applicable) which need to be completed and submitted to the Aircraft Registry to support each specific approval applied for.

1.2 Application Forms

By signing the Form 4 and/or Form 4a the applicant is declaring that the:

- aircraft meets the certification standards for the operational approvals being requested, and robust procedures are in place that meets the operational criteria required.
- flight crew are, and will continue to be, suitably trained and competent to operate in the approved Designated Airspace/PBN Airspace and appropriate procedures have been instituted in respect of continuing airworthiness to ensure continued conformity.
- declaration statements contained in this RP for FANS 1/A, FANS 1/A+ (PBCS), ATN B1 and ADS-B (if being applied for) are met.

Please note the Registry will only accept a Form 4 and Form 4a signed by either the named operator contact(s) or the Flight Operations Representative (FOR) as recorded on the current Form 20.

1.3 Documentary Evidence

Section 3 of Form 4 and Form 4a includes operating approvals compliance or renewal guidance in support of the declaration statement in Section 5 of the forms and identifies the types of certification evidence acceptable to support the application.
2.1 RVSM (Reduced Vertical Separation Minima)

In accordance with Article 66 of the Air Navigation (Isle of Man) Order 2015 as amended an aircraft registered in the Isle of Man must not fly in RVSM airspace without an approval issued by the IOMAR unless otherwise authorised by the appropriate air traffic control unit.

Reduced Vertical Separation Minimum in RVSM Airspace permits the application of a 1000 ft (300 m) vertical separation minimum between suitably equipped aeroplanes in the level band from FL290 to FL410 (inclusive). The purpose of RVSM is to increase airspace capacity and provide airspace users with more flight levels and thus optimised flight profiles. RVSM approval may be a prerequisite for other approvals, for example North Atlantic High Level Airspace (Minimum Navigation Performance Specification) (NAT HLA (MNPS)).

Aeroplane wishing to avoid RVSM airspace must fly either below FL290 or above FL 410.

2.1.1 RVSM Approval Requirements

Operators wishing to apply for RVSM airspace approval must demonstrate the aircraft is certified and equipped.

Training evidence is not required as part of the initial or renewal application process although it is the responsibility of the operator to ensure all flight crew are suitably trained and competent to operate within this specific airspace.

2.1.2 RVSM Manual

Following RVSM acceptance, the IOMAR will provide an Operations Specification (Ops Spec) Certificate showing the aircraft is approved to operate in RVSM airspace and also provide a copy of RP 30 Operating Guidance and Information for RVSM Operations.

2.1.3 RVSM Height Monitoring Requirements

2.2 NAT HLA (MNPS)

In accordance with Article 65 of the Air Navigation (Isle of Man) Order 2015 as amended, an aircraft registered in the Isle of Man must not fly in MNPS airspace (now renamed NAT HLA (MNPS)) without an approval issued by the IOMAR.

2.2.1 NAT HLA (MNPS) Approval Requirements

Operators wishing to apply for NAT HLA airspace approval must demonstrate the aircraft is certified and equipped.

Training evidence is not required as part of the initial or renewal application process although it is the responsibility of the operator to ensure all flight crew are suitably trained and competent to operate within this specific airspace.

There are 2 types of NAT HLA approval which operators can apply for, ‘unrestricted’ and ‘restricted’.

2.2.1.1 Unrestricted NAT HLA

To operate unrestricted in NAT HLA airspace the aircraft must be equipped with:

(a) 2 Long Range Navigation Systems (LRNS); and

(b) 2 Long Range Communication Systems (LRCS), one of which must be a HF radio.

Note: Aeronautical Mobile Satellite (Route) Service (AMS(R)S) also known as SATCOM Voice, may be used to supplement HF communications throughout the NAT Region. SATCOM cannot be used as an alternative to HF prior to entering NAT HLA.

In addition, RNP 10 or RNP 4 approval is required.

To use the PBCS Tracks the aircraft must have an approval for RNP 4 and FANS 1/A+ (PBCS).

2.2.1.2 Restricted NAT HLA

Aircraft fitted with a single Long Range Navigation System (LRNS) may apply for Restricted NAT HLA (MNPS) approval which will limit the aircraft operation to routes with a dispatch requirement of 1 LRNS (some of which are known as the ‘Blue Spruce Routes’).

Aircraft without a HF radio are limited to a certain number of the Blue Spruce Routes. For further details please refer to the latest version of the ICAO NAT Doc 007 North Atlantic Airspace and Operations Manual.

2.2.2 NAT HLA (MNPS) Manual

Following NAT HLA (MNPS) acceptance, the IOMAR will provide an Operations Specification (Ops Spec) certificate showing the aircraft is approved to operate in NAT HLA airspace. The Operator will also be provided with a copy of RP 31 Operating Guidance and Information for NAT HLA (MNPS) Operations, and RP 43 NAT HLA (MNPS) Checklist.
Chapter 3: PBN Airspace Operating Approvals

Aircraft operating within PBN airspace are required to meet the prescribed minimum standards of navigational performance capability through the mandatory carriage and proper use of a specified level of area navigation equipment that, in the case of an aircraft registered in the Isle of Man, has been approved by the Isle of Man Aircraft Registry for the purpose, in accordance with Article 67 of the Air Navigation (Isle of Man) Order 2015.

Aircraft used to conduct PBN operations must be equipped with an RNAV system able to support the desired navigation application. The RNAV system and aircraft operations must be compliant with regulatory material that reflects the navigation specification developed for a particular navigation application approved by the appropriate regulatory authority for the operation.

The navigation specification details the flight crew and aircraft requirements needed to support the navigation application. This specification includes the level of navigation performance, functional capabilities, and operational considerations required for the RNAV system. The RNAV system installation should be certified in accordance with applicable regulations and operational procedures should respect the applicable Aircraft Flight Manual (AFM) limitations, if any.

The RNAV system should be operated in accordance with recommended practices described in the subsequent sections. Flight crew must adhere to any operational limitations required for the navigation application.

3.0 PBN Approvals

The IOMAR is able to issue a number of PBN approvals, including operations in oceanic, continental, en-route, approach arrival and departure.

More details on each PBN Approval can be found in the following sections of Chapter 3.

3.0.1 PBN Approval Requirements

Operators wishing to apply for PBN airspace approval(s) must demonstrate the aircraft is certified and equipped.

3.0.1.1 Airworthiness Approval

The airworthiness approval process assures that each item of PBN equipment installed is of a type and design appropriate to its intended function, and that the installation functions properly under foreseeable operating conditions.

However, some PBN equipment and installations may have been certified prior to the publication of the latest ICAO PBN Manual and the adoption of its terminology for the navigation specifications; it is not always possible to find a clear statement of aircraft PBN capability in the AFM.

Each PBN which the IOMAR can approve is contained in the following subchapters. Within each subchapter is a paragraph headed “Acceptable Means of Compliance for Approval of XXX”. This paragraph includes alternative means of compliance which demonstrates the aircraft’s eligibility for a specific PBN specification if the specific term is not used.

3.0.1.1 Acceptable Documentation for Demonstration of Compliance

a) AFM;

b) AFM Supplement;
c) Service Bulletin or Service Letter issued by the TC holder or STC holder;

Any other formal document issued by the TC or STC holders stating compliance with RVSM, NAT HLA or PBN specifications, including AMC, Advisory Circulars (AC) or similar documents issued by the State of Design.

3.0.1.2 Approval of RNAV Systems for RNAV-X Operations

The RNAV system installed should be compliant with a set of basic performance requirements as described in the navigation specification, which defines accuracy, integrity and continuity criteria. It should also be compliant with a set of specific functional requirements, have a navigation database, and support each specific path terminator as required by the navigation specification.

For a multi-sensor RNAV system, an assessment should be conducted to establish which sensors are compliant with the performance requirement described in the navigation specification. The navigation specification generally indicates if a single or a dual installation is necessary to fulfil availability and/or continuity requirements. The airspace concept and NAVAID infrastructure are key elements in deciding if a single or a dual installation is necessary.

3.0.1.3 Approval of RNP Systems for RNP-X Operations

The RNP system installed should be compliant with a set of basic RNP performance requirements, as described in the navigation specification, which should include an on-board performance monitoring and alerting function. It should also be compliant with a set of specific functional requirements, have a navigation database, and should support each specific path terminator as required by the navigation specification.

For a multi-sensor RNP system, an assessment should be conducted to establish sensors which are compliant with the RNP performance requirement described in the RNP specification.

3.0.1.4 Operational Approval

The aircraft must be equipped with an RNAV system enabling the flight crew to navigate in accordance with operational criteria as defined in the navigation specification. The Isle of Man Aircraft Registry is the authority responsible for granting operational approvals.

3.0.1.5 Training

Training requirements for each PBN airspace are listed against each PBN specification in the following sub-chapters.

3.0.2 PBN Manual

Following a PBN airspace approval, the IOMAR will provide an Operations Specification (Ops Spec) certificate showing the aircraft is approved to operate in specific PBN airspace and also provide a copy of RP32 PBN Operator Guidance and Information.
3.0.3 **PBN Airspace Category Table**

RNAV/RNP airspace is defined by the accuracy of the navigation to take place within it. The table below lists the types of RNAV/RNP airspace and operational locations (the numbers shown in the Table refer to the 95% accuracy requirements in nautical miles):

<table>
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<td>En-Route Continental</td>
<td>ARR</td>
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<td>RNP 2</td>
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Notes:

(1): Only applies once 50 m (40 m, Cat H) obstacle clearance has been achieved after the start of climb.

(2): RNAV 5 is an en-route navigation specification which may be used for the initial part of a STAR outside 30 NM.

(3): The RNP 1 specification is limited to use on STARs, SIDs, the initial and intermediate segments of IAPs and the missed approach after the initial climb phase. Beyond 30 NM from the ARP, the accuracy value for alerting becomes 2 NM.

3.0.4 **PBN Example**

For any particular PBN operation, it is possible that a sequence of RNAV and RNP applications may be used. A flight may commence in an airspace using a RNP 1 SID, transit through en-route then oceanic airspace requiring RNAV 2 and RNP 4, respectively, and culminate with terminal and approach operations requiring RNAV 1 and RNP APCH, for example:

![PBN Example Diagram](image-url)
3.1 **RNAV 10 (RNP 10)**

Although RNAV 10 airspace is, for historical reasons, also called RNP 10 airspace, there is no requirement for onboard monitoring and alerting systems.

3.1.1 **Accuracy**

A track-keeping accuracy equal to or better than +/- 10 NM for 95% of the flight time without regular updates from ground-based navigation aids.

RNAV 10 can support 50 NM track spacing.

3.1.2 **Category & Area of Operation**

RNAV 10 is for operations in oceanic and remote areas and does not require any ground-based NAVAID infrastructure or assessment.

3.1.3 **Minimum Navigation Equipment**

For an aircraft to operate in RNAV 10 (RNP 10) airspace it needs to be equipped with a minimum of two independent long range navigation systems (LRNSs).

Each LRNS should in principle have a flight management system (FMS) that utilises positional information from either an approved global navigation satellite system (GNSS) or an approved inertial reference system (IRS) or mixed combination.

The mix of sensors (pure GNSS, pure IRS or mixed IRS/GNSS) determines pre-flight and in-flight operation and contingencies in the event of system failure.

3.1.4 **Minimum Communication & ATS Surveillance**

Minimum communication and ATS surveillance is not established globally by ICAO. The operating crew must ensure the minimum communication requirements are met by reviewing the appropriate Aeronautical Information Publication.

3.1.5 **Minimum Equipment List**

The MEL should specify the required dispatch conditions for RNAV 10 operations.

3.1.6 **Training Requirements**

The Operator, must ensure, and continue to ensure that pilots are knowledgeable of the RNAV 10 operating practices and procedures.

3.1.7 **Navigation Database**

The navigation database must be current and appropriate for the operations and must include the NAVAIDs and waypoints required for the route.

3.1.8 **Acceptable Means of Compliance for Approval of RNAV 10 (RNP 10)**

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNAV 10 must be provided to support the application.

Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the document listed in [3.0.1.1 Acceptable Document for Demonstration of Compliance](#), the aircraft is eligible for RNAV 10 operations:

(a) RNP 10;

(b) FAA AC 20-138 for the appropriate navigation specification;
(c) AMC 20-12;

(d) FAA Order 8400.12 (or later revision); and

(e) FAA AC 90-105.
3.2 RNP 4 (FANS 1/A Required)

RNP 4 was developed for operations in oceanic and remote airspace; therefore, it does not require any ground-based NAVAID infrastructure. GNSS is the primary navigation sensor to support RNP 4, either as a stand-alone navigation system or as part of a multi-sensor system.

3.2.1 Accuracy

RNP 4 provides a track-keeping accuracy equal to or better than +/- 4 NM for 95% of the flight time without regular updates from ground-based navigation aids.

3.2.2 Category & Area of Operation

RNP 4 is for operations in oceanic and remote areas and does not require any ground-based NAVAID infrastructure or assessment.

3.2.3 Minimum Navigation Equipment

To meet the accuracy of RNP 4, two independent LRNSs are required for which GNSS sensors are mandatory. If GNSS is used as a stand-alone LRNS, an integrity check is foreseen (fault detection and exclusion). RNP 4 shall not be used in areas of known GNSS signal interference. If an item of equipment required for RNP 4 operations is unserviceable, then the pilot should consider an alternate route or diversion for repairs.

3.2.4 Minimum Communication & ATS Surveillance

Additional aircraft requirements include two long range communication systems (LRCSs) in order to operate in RNP 4 designated airspace. The appropriate Aeronautical Information Publication (AIP) should be consulted to assess coverage of HF and SATCOM.

The IOMAR requires evidence of automatic dependent surveillance – contract (ADS–C) and controller pilot data link communication (CPDLC) equipment before a request for RNP 4 approval can be considered.

3.2.5 Minimum Equipment List

The MEL must specify the required dispatch conditions for RNP 4 operations.

3.2.6 Training Requirements

The training requirements should be in accordance with the ICAO PBN Manual (Doc 9613) for RNP 4 and in accordance with the requirements of the pilot’s license.

3.2.7 Navigation Database

The navigation database should be obtained from a supplier that complies with RTCA DO 200A/EUROCAE document ED 76, Standards for Processing Aeronautical Data. An LOA issued by the appropriate regulatory authority demonstrates compliance with this requirement.

The operator must report any discrepancies invalidating an ATS route to the navigation database supplier, and the operator must take actions to prohibit their pilots from flying the affected ATS route.

Aircraft operators may conduct periodic checks of the operational navigation databases in order to meet existing quality system requirements.

Note: To minimize PDE, the database should comply with DO-200A/ED-76, or an equivalent operational means must be in place to ensure database integrity for RNP 4.
3.2.8 Acceptable Means of Compliance for Approval of RNP 4

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNP 4 must be provided to support the application.

Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the document listed in 3.0.1.1 Acceptable Document for Demonstration of Compliance, the aircraft is eligible for RNP 4 operations:

(a) FAA AC 20-138B or later, for the appropriate navigation specification;

(b) FAA Order 8400.33; and

(c) FAA AC 90-105 for the appropriate navigation specification.
3.3 **RNP 2**

RNP 2 is primarily intended for a diverse set of en-route applications, particularly in geographic areas with little or no ground NAVAID infrastructure, limited or no ATS surveillance, and low to medium density traffic. Use of RNP 2 in continental applications requires a lower continuity requirement than used in oceanic/remote applications.

### 3.3.1 Accuracy

RNP 2 provides a track-keeping accuracy equal to or better than +/- 2 NM for 95% of the flight time without regular updates from ground-based navigation aids.

Unlike RNP 4 there is no standard track spacing for RNP 2.

### 3.3.2 Category & Area of Operation

There are 2 types of RNP 2, Continental and Oceanic/Remote:

1. RNP 2 Continental, one LRNS is required for which GNSS sensors are mandatory; and
2. RNP 2 Oceanic/Remote for which two independent LRNSs are required, for which GNSS sensors are mandatory,

*Note:* Operators of aircraft with a single LRNS can only apply for RNP 2 Continental. Operators of aircraft with 2 LRNSs can apply for RNP 2 Oceanic/Remote and Continental approval.

### 3.3.3 Minimum Navigation Equipment

The RNP 2 specification is based upon GNSS.

Operators relying on GNSS are required to have the means to predict the availability of GNSS fault detection (e.g. ABAS RAIM) to support operations along the RNP 2 ATS route. The on-board RNP system, GNSS avionics, the ANSP or other entities may provide a prediction capability. The AIP should clearly indicate when prediction capability is required and an acceptable means to satisfy that requirement.

RNP 2 shall not be used in areas of known GNSS signal interference.

### 3.3.4 Minimum Communication & ATS Surveillance

Communication performance on RNP 2 routes will be commensurate with operational considerations such as route spacing, traffic density, complexity and contingency procedures. The operating crew must ensure the minimum communication requirements are met by reviewing the appropriate Aeronautical Information Publication.

### 3.3.5 Minimum Equipment List

The MEL should specify the required dispatch conditions for RNP 2 operations.

### 3.3.6 Training Requirements

The training requirements should be in accordance with the ICAO PBN Manual (Doc 9613) for RNP 2 and in accordance with the requirements of the pilot’s license.

### 3.3.7 Navigation Database

The navigation database should be obtained from a supplier that complies with RTCA DO 200A/EUROCAE document ED 76, Standards for Processing Aeronautical Data. An LOA issued by the appropriate regulatory authority demonstrates compliance with this requirement.
Chapter 3.3 – RNP 2

The operator must report any discrepancies invalidating an ATS route to the navigation database supplier, and the operator must take actions to prohibit their pilots from flying the affected ATS route.

Aircraft operators may conduct periodic checks of the operational navigation databases in order to meet existing quality system requirements.

3.3.8 Acceptable Means of Compliance for Approval of RNP 2

3.3.8.1 RNP 2 Continental

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNP 2 Continental must be provided to support the application.

Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the document listed in 3.0.1.1 Acceptable Document for Demonstration of Compliance, the aircraft is eligible for RNP 2 Continental operations:

(a) FAA AC 20-138 for the appropriate navigation specification; and

(b) FAA AC 90-105

3.3.8.2 RNP 2 Oceanic/Remote

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNP 2 Continental must be provided to support the application.

Alternatively:

1) If a statement of compliance with FAA AC 90-105 for the appropriate navigation specification is found in any of the document listed in 3.0.1.1 Acceptable Document for Demonstration of Compliance, the aircraft is eligible for RNP 2 Oceanic/Remote. Or

2) If the aircraft has been assessed eligible for RNP 4, the aircraft is eligible for RNP 2 oceanic.
3.4 **RNAV 5 (B-RNAV/RNP 5)**

RNAV 5, also known as B-RNAV in Europe is a basic area navigation capability.

### 3.4.1 Accuracy

A track-keeping accuracy equal to or better than +/- 5 NM for 95% of the flight time.

### 3.4.2 Category & Area of Operation

RNAV 5 systems permit aircraft navigation along any desired flight path within the coverage of station referenced NAVAIDs (space or terrestrial) or within the limits of the capability of self-contained aids, or a combination of both methods.

B-RNAV is mandated above FL95 throughout European States and also applied in the Middle East (where it may be called RNP 5).

In the UK B-RNAV is applicable on all UK ATS routes at all levels/altitudes in controlled airspace.

### 3.4.3 Minimum Navigation Equipment

RNAV 5 operations are based on the use of RNAV equipment which automatically determines the aircraft position using input from one or a combination of the following types of position sensors, together with the means to establish and follow a desired path:

(a) VOR/DME;

(b) DME/DME;

(c) INS or IRS; and

(d) GNSS.

### 3.4.4 Minimum Communication & ATS Surveillance

Direct pilot to ATC (voice) communications is required.

Radar monitoring by ATS may be used to mitigate the risk of gross navigation errors, provided the route lies within the ATS surveillance and communications service volumes and the ATS resources are sufficient for the task.

### 3.4.5 Minimum Equipment List

The MEL should specify the required dispatch conditions for RNAV 5 operations.

### 3.4.6 Training Requirements

The training requirements should be in accordance with the ICAO PBN Manual (Doc 9613) for RNAV-5 and in accordance with the requirements of the pilot’s license.

### 3.4.7 Navigation Database

Where a navigation database is carried and used, it should be current and appropriate for the intended operations and must include the NAVAIDs and waypoints required for the route.

### 3.4.8 Acceptable Means of Compliance for Approval of RNAV 5 (B-RNAV/RNP 5)

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNAV 5 must be provided to support the application.
Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the document listed in 3.0.1.1 Acceptable Document for Demonstration of Compliance, the aircraft is eligible for RNAV 5 operations:

(a) B-RNAV;
(b) RNAV 1;
(c) RNP APCH;
(d) RNP 4;
(e) AMC 20-4;
(f) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 2 (TGL 2);
(g) JAA AMJ 20X2;
(h) FAA AC 20-130A for en route operations;
(i) FAA AC 20-138 for en route operations; and
(j) FAA AC 90-96.
3.5 **RNAV 1 (P-RNAV) RNAV 2**

The RNAV 1 and 2 standards resulted from the harmonisation of US and European standards. P-RNAV does not fully meet the RNAV 1 standard. Aircraft requirements for RNAV 1 and RNAV 2 are identical, whilst some operating procedures are different.

### 3.5.1 Accuracy

RNAV 1 (P-RNAV) provides a track-keeping accuracy equal to or better than +/- 1 NM for 95% of the flight time.

RNAV 2 provides a track-keeping accuracy equal to or better than +/- 2 NM for 95% of the flight time.

### 3.5.2 Category & Area of Operation

The RNAV 1 & RNAV 2 specification is applicable for area navigation operations globally. RNAV 1 and RNAV 2 are suitable for en-route continental operations and Departure and Arrival routes.

RNAV 1 (PRNAV) is also suitable for Initial, Intermediate and Missed Approach (refer to 3.0.3).

P-RNAV is applicable for terminal airspace only within European Airspace. P-RNAV can be used for GNSS-based RNAV 1 procedures in the USA.

### 3.5.3 Minimum Navigation Equipment

RNAV 1 and RNAV 2 operations are based upon the use of RNAV equipment that automatically determines the aircraft position in the horizontal plane using input from the following types of position sensors (no specific priority):

- (a) GNSS in accordance with FAA TSO-C145 (), TSO-C146 (), or TSO-C129 (). Positioning data from other types of navigation sensors may be integrated with the GNSS data provided other position data does not cause position errors exceeding the total system accuracy requirements. The use of GNSS equipment approved to TSO-C129 () is limited to those systems which include the minimum functions specified in 3.3.3.3. of the ICAO PBN Manual. As a minimum, integrity should be provided by an ABAS. In addition, TSO-C129 equipment should include the following additional functions:
  - (b) pseudo-range step detection;
  - (c) health word checking;
  - (d) DME/DME RNAV equipment; and
  - (e) DME/DME/IRU RNAV equipment.

*Note:* Refer to ICAO PBN Manual (Doc 9613) for further details.

### 3.5.4 Minimum Communication & ATS Surveillance

Where reliance is placed on the use of radar to assist contingency procedures, its performance should be adequate for that purpose, i.e. radar coverage, its accuracy, continuity and availability should be adequate to ensure separation on the RNAV 1 and RNAV 2 ATS route structure and provide contingency in cases where several aircraft are unable to achieve the navigation performance prescribed in this navigation specification.
3.5.5 Minimum Equipment List

The MEL should specify the required dispatch conditions for RNAV 1(P-RNAV) and RNAV-2 operations.

3.5.6 Training Requirements

The training requirements should be in accordance with the ICAO PBN Manual (Doc 9613) for RNAV 1 and RNAV 2 and in accordance with the requirements of the pilot’s license.

P-RNAV training requirements should be in accordance with TGL-10 and in accordance with the requirements of the pilot’s license.

3.5.7 Navigation Database

The navigation database should be obtained from a supplier that complies with RTCA DO 200A/EUROCAE document ED 76, Standards for Processing Aeronautical Data and should be compatible with the intended function of the equipment (Annex 6, Part 1, Chapter 7). An LOA, issued by the appropriate regulatory authority to each of the participants in the data chain, demonstrates compliance with this requirement (e.g. FAA LOA issued in accordance with FAA AC 20-153 or EASA LOA issued in accordance with EASA Opinion Nr. 01/2005).

Discrepancies that invalidate a route must be reported to the navigation database supplier and affected routes must be reported to the pilots.

3.5.8 Acceptable Means of Compliance for Approval of RNAV 1 (P-RNAV) RNAV 2

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNAV 1 (P-RNAV) RNAV 2 must be provided to support the application.

Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the document listed in 3.0.1.1 Acceptable Document for Demonstration of Compliance, the aircraft is eligible for RNAV 1 (P-RNAV) RNAV 2 operations:

- (a) RNAV 1;
- (b) US RNAV type A;
- (c) FAA AC 20-138 for the appropriate navigation specification;
- (d) FAA AC 90-100A;
- (e) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 10 Rev1 (TGL 10);
- (f) FAA AC 90-100, and;
- (g) P-RNAV (refer to Table II-B-3-1 from ICAO Doc 9613).

However, if position determination is exclusively computed based on VOR-DME, the aircraft is not eligible for RNAV 1/RNAV 2 operations.
3.6 RNP 1

The RNP 1 specification provides a means to develop routes for connectivity between the en-route structure and terminal airspace with no or limited ATS surveillance, with low to medium density traffic.

RNP 1 specification is based upon GNSS. While DME/DME-based RNAV systems are capable of RNP 1 accuracy, this navigation specification is primarily intended for environments where the DME infrastructure cannot support DME/DME area navigation to the required performance. The increased complexity in the DME infrastructure requirements and assessment means it is not practical or cost-effective for widespread application.

3.6.1 Accuracy

RNP 1 provides a track-keeping accuracy equal to or better than +/- 1 NM for 95% of the flight time for the following segments:

(a) arrival*
(b) initial approach
(c) intermediate approach
(d) missed approach#
(e) departure*

*Beyond 30nm from the ARP, the accuracy value for alerting becomes +/-2 NM.
# Area of application can only be used after the initial climb of a missed approach phase.

3.6.2 Category & Area of Operation

RNP 1 is primarily intended for arrival and departure capability in terminal areas for use at aerodromes with low traffic density where ATS radar surveillance is limited or not available, and is limited to STARs and SIDs.

3.6.3 Minimum Navigation Equipment

The following systems meet the accuracy, integrity and continuity requirements of these criteria:

(a) aircraft with E/TSO-C129a sensor (Class B or C), E/TSO-C145() and the requirements of E/TSOC115b FMS, installed for IFR use in accordance with FAA AC 20-130A;
(b) aircraft with E/TSO-C129a Class A1 or E/TSO-C146() equipment installed for IFR use in accordance with FAA AC 20-138 or AC 20-138A; and
(c) aircraft with RNP capability certified or approved to equivalent standards.

Note: For RNP procedures, the RNP system may only use DME updating when authorized by the State.

RNP 1 shall not be used in areas of known navigation signal (GNSS) interference.

3.6.4 Minimum Communication & ATS Surveillance

This navigation specification is intended for environments where ATS surveillance is either not available or limited.

RNP 1 SIDs/STARs are primarily intended to be conducted in DCPC environments.
3.6.5 Minimum Equipment List

The MEL should specify the required dispatch conditions for RNP 1 operations.

3.6.6 Training Requirements

The training requirements should be in accordance with the ICAO PBN Manual (Doc 9613) for RNP 1 and in accordance with the requirements of the pilot’s license.

3.6.7 Navigation Database

The navigation database must be obtained from a supplier that complies with RTCA DO 200A/EUROCAE document ED 76, Standards for Processing Aeronautical Data. An LOA issued by the appropriate regulatory authority to each of the participants in the data chain demonstrates compliance with this requirement (e.g. FAA LOA issued in accordance with FAA AC 20-153 or EASA LOA issued in accordance with EASA Opinion Nr. 01/2005.

Discrepancies that invalidate a SID or STAR must be reported to the navigation database supplier, and the affected SID or STAR must be prohibited by an operator’s notice to its pilots.

Aircraft operators may conduct periodic checks of the operational navigation databases in order to meet existing quality system requirements.

**Note:** To minimize PDE, the database should comply with DO 200A, or an equivalent operational means must be in place to ensure database integrity for the RNP 1 SIDs or STARs.

3.6.8 Acceptable Means of Compliance for Approval of RNP 1

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNP 1 must be provided to support the application.

Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the document listed in [3.0.1.1 Acceptable Document for Demonstration of Compliance](#), the aircraft is eligible for RNP 1 operations:

(a) RNP 2 Continental

(b) FAA AC 20-138 for the appropriate navigation specification; and

(c) FAA AC 90-105.

Alternatively, if a statement of compliance with any of the following specifications or standards is found in the acceptable documentation as listed above and position determination is primarily based on GNSS, the aircraft is eligible for RNP 1.

However, in the cases mentioned in:

(a) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 10 (TGL 10) (any revision); and

(b) FAA AC 90-100,

loss of GNSS implies loss of RNP 1 capability.
3.7 RNP APCH/RNAV (GNSS)

Also known as RNAV (GNSS) the standard includes LNAV, LNAV/VNAV, LPV & LP approaches.

2D Approach Operations - LNAV and LP use lateral guidance only;

LP approaches are available at few aerodromes and many aircraft types are not equipped to carry them out. These are also known as RNP Approach in the United States of America.

3D Approach Operations - LNAV/VNAV and LPV use both lateral and vertical guidance.

LNAV/VNAV is also known as APV-Baro VNAV.

LPV is also known as APV SBAS.

3.7.1 Accuracy

Refer to the PBN airspace category table (3.0.3)

3.7.2 Category & Area of Operation

RNP APCH is for use during approach and missed-approaches.

3.7.3 Minimum Navigation Equipment

The following systems meet the accuracy, integrity and continuity requirements of these criteria:

(a) GNSS stand-alone systems, equipment should be approved in accordance with TSO-C129a/ ETSO-C129a Class A, E/TSO-C146() Class Gamma and operational class 1, 2 or 3, or TSO C-196();

(b) GNSS sensors used in multi-sensor system (e.g. FMS) equipment should be approved in accordance with TSO C129 ( )/ ETSO-C129 ( ) Class B1, C1, B3, C3 or E/TSO C145() class 1, 2 or 3, or TSO C-196(). For GNSS receiver approved in accordance with E/TSO-C129(), capability for satellite FDE is recommended to improve continuity of function; and

(c) multi-sensor systems using GNSS should be approved in accordance with AC20-130A or TSO-C115b, as well as having been demonstrated for RNP APCH capability.

3.7.4 Minimum Communication & ATS Surveillance

RNP APCH does not include specific requirements for communication or ATS surveillance.

Adequate obstacle clearance is achieved through aircraft performance, operating procedures and procedure design. Where reliance is placed on the use of radar to assist contingency procedures, its performance will be shown to be adequate for that purpose, and the requirement for a radar service will be identified in the AIP.

RT phraseology appropriate to RNP APCH operations will be promulgated.

3.7.5 Minimum Equipment List

The MEL should specify the required dispatch conditions for RNP APCH operations to LNAV, LNAV/VNAV, LPV and/or LP minima as appropriate.
3.7.6 Training Requirements

The training requirements should be in accordance with the ICAO PBN Manual (Doc 9613) for RNP APCH to LNAV, LNAV/VNAV, LPV and/or LP minima, and in accordance with the requirements of the pilot’s license.

3.7.7 Navigation Database

The Operator should implement procedures that ensure timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that require it.

The Operator must hold a valid copy of the Navigation Database Management Type 2 LoA, or equivalent, issued by EASA, FAA or Transport Canada.

Note:
(i) EASA Type 2 LoA is issued by EASA in accordance with EASA OPINION Nr. 01/2005 on “The Acceptance of Navigation Database Suppliers” dated 14 Jan 05, or

(ii) The FAA Type 2 LoA in accordance with AC 20-153A.

(iii) Transport Canada (TCCA) issues an acknowledgement letter of an Aeronautical Data Process using the same basis.

Discrepancies that invalidate a procedure must be reported to the navigation database supplier and affected procedures must be prohibited by an operator’s notice to its pilots.

The Operator may wish to conduct ongoing checks of the operational navigation databases in order to meet existing quality system requirements.

3.7.8 Acceptable Means of Compliance for Approval of RNP APCH

Any limitation such as ‘within the US National Airspace’ may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

3.7.8.1 RNP APCH – LNAV Minima

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNP APCH – LNAV must be provided to support the application.

Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the document listed in 3.0.1.1 Acceptable Document for Demonstration of Compliance, the aircraft is eligible for RNP APCH – LNAV operations:

(a) AMC 20-27;

(b) AMC 20-28;

(c) FAA AC 20-138 for the appropriate navigation specification; and

(d) FAA AC 90-105 for the appropriate navigation specification.

Or, if a statement of compliance with RNP 0.3 GNSS approaches in accordance with any of the following specifications or standards is found in the acceptable documentation as listed above, the aircraft is eligible for RNP APCH — LNAV operations. Any limitation such as ‘within the US National Airspace’ may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

(a) JAA TEMPORARY GUIDANCE MATERIAL, LEAFLET NO. 3 (TGL 3);
3.7.8.2 **RNP APCH – LNAV/VNAV minima**

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNP APCH – LNAV/VNAV must be provided to support the application.

Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the documentation listed in **3.0.5.1 Acceptable Document for Demonstration of Compliance**, the aircraft is eligible for RNP APCH – LNAV/VNAV operations: -

(a) AMC 20-27 with Baro VNAV;
(b) AMC 20-28;
(c) FAA AC 20-138; and
(d) FAA AC 90-105 for the appropriate navigation specification.

Or, if a statement of compliance with FAA AC 20-129 is found in the acceptable documentation listed in **3.0.5.1 Acceptable Document for Demonstration of Compliance**, and the aircraft complies with the requirements and limitations of EASA SIB 2014-04, the aircraft is eligible for RNP APCH — LNAV/VNAV operations. Any limitation such as ‘within the US National Airspace’ may be ignored since RNP APCH procedures are assumed to meet the same ICAO criteria around the world.

3.7.8.3 **RNP APCH – LPV Minima**

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNP APCH – LPV must be provided to support the application.

Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the documentation listed in **3.0.5.1 Acceptable Document for Demonstration of Compliance**, the aircraft is eligible for RNP APCH – LPV operations: -

(a) AMC 20-28;
(b) FAA AC 20-138 for the appropriate navigation specification; and
(c) FAA AC 90-107.

3.7.8.4 **RNP APCH – LP Minima**

Documentary evidence to demonstrate that the aircraft is suitably equipped for RNP APCH – LP must be provided to support the application.

Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the documentation listed in **3.0.5.1 Acceptable Document for Demonstration of Compliance**, the aircraft is eligible for RNP APCH – LP operations: -

(a) FAA AC 20-138 for the appropriate navigation specification; and
(b) FAA AC 90-107.
3.7.9 Operational Criteria

Before planning a flight to an aerodrome (destination or alternate) with the intent to use an RNP APCH procedure contained in the Navigation Database, the operator should give consideration to an evaluation of any new or modified RNP APCH procedures.

Particular attention may be paid to procedures:

- in mountainous environments,
- within the proximity of well-known obstacles,
- in the absence of radar coverage,
- have a missed approach trajectory involve turns, especially at low altitudes, or
- are subject to a declared exemption to the procedure design rules specified by the ICAO PANS OPS.

An operational evaluation of a RNP APCH procedure of the above mentioned operational characteristics may include, at operator discretion, an approach conducted with the aircraft in VMC or the use of a full flight simulator (FFS) in order to evaluate if the procedure is correctly executed by the navigation system and fly-able with the aircraft type.

Based on the results of the assessment, the appropriate information should be given to the operating crew.

3.7.9.1 Temperature Limits (when using baro-VNAV)

Baro-VNAV operations may be subject to temperature limitation.

When the aerodrome temperature is 0°C or colder, the temperature error correction must be added to:

- DH/DA or MDH/MDA and step-down fixes inside the final approach fix (FAF).
- All low altitude approach procedure altitudes in mountainous regions (terrain of 3000 ft AMSL or higher)

Operators using baro-VNAV in an aircraft with an airworthiness approval for automatic temperature compensation, or in an aircraft using an alternate means for vertical guidance e.g. Satellite-Based Augmentation Systems (SBAS), may disregard the temperature limits (high temperature limit still applies if the system only compensates for low temperature).
Chapter 3.8 – RNP AR APCH

3.8 RNP AR APCH (RNP Authorisation Required)/RNAV (RNP)

RNP AR APCH specification (sometimes referred to as SAAAR - Special Aircraft and Aircrew Authorization Required) also known as RNAV (RNP), represents the ICAO global standard for developing IAPs to airports where limiting obstacles exist and/or where significant operational efficiencies can be gained.

These procedures require additional levels of scrutiny, control and authorization. The increased risks and complexities associated with these procedures are mitigated through more stringent RNP criteria, advanced aircraft capabilities and increased aircrew training.

All RNP AR procedures have reduced lateral obstacle evaluation areas and vertical obstacle clearance surfaces predicated on the aircraft and aircrew performance requirements of this section.

A critical component of RNP is the ability of the aircraft navigation system to monitor its achieved navigation performance, and to identify to the pilot whether the operational requirement is or is not being met during an operation.

The criteria (both procedure design and certification) may take account of the fact that aircraft with different flight guidance capabilities will be used to fly the procedures. However, the procedure design criteria do reflect specific levels of aircraft performance and capability for the barometric VNAV aspects of the operation.

In addition to receiving approval by the IOMAR to conduct RNP AR (Authorization Required) APCH procedures, additional approval from the State within which the procedure is located may be required.

3.8.1 RNP AR APCH Characteristics

3.8.1.1 Accuracy

All aircraft operating on RNP AR APCH procedures must have a cross-track navigation error no greater than the applicable accuracy value (0.1 nm to 0.3 nm) for 95% of the flight time. This includes positioning error, flight technical error (FTE), path definition error (PDE) and display error. Also, the aircraft along-track positioning error must be no greater than the applicable accuracy value for 95% of the flight time. In addition, vertical accuracy criteria apply.

3.8.1.2 RNP Value

Each published line of minima has an associated RNP value. RNP AR procedures may have an RNP value of RNP 0.3 or less.

3.8.1.3 Procedures with radius to a Fix (RF) Legs

Some RNP AR procedures include RF legs. The instrument approach charts will indicate requirements for RF legs in the notes section or at the applicable initial approach fix (IAF).

3.8.1.4 Missed approaches requiring less than RNP 1.0

At certain locations, the airspace or obstacle environment may require RNP capability of less than 1.0 nm during a missed approach. Operation on these approaches typically requires redundant equipment. This requirement ensures that no single point of failure can cause loss of RNP capability.

3.8.1.5 Non-Standard Speeds or Climb Gradients

Normally, RNP AR procedure design relies on standard approach speeds and climb gradients including the Missed Approach Segment (MAS). The approach procedure will
indicate any exceptions to these standards, and the operator must ensure it can comply with any published restrictions before conducting these approach operations.

### 3.8.1.6 Temperature Limits (when using baro-VNAV)

1. The RNP AR APCH chart (see example below) will identify outside air temperature limits applicable to operators using barometric vertical navigation (baro-VNAV). Cold temperatures reduce the effective glide path angle while high temperatures increase the effective glide path angle without cockpit indication of the variation.

**Note:** Temperature affects the aircraft’s actual altitude AGL/AMSL. The effect is similar to high and low pressure changes, although not as significant. When temperature is higher than the International Standard Atmosphere (ISA), the aircraft will be higher than the indicated altitude. When temperature is lower than standard, the aircraft will be lower than indicated on the altimeter. When the aerodrome temperature is 0°C or colder, the temperature error correction must be added to:

- DH/DA or MDH/MDA and step-down fixes inside the final approach fix (FAF).
- All low altitude approach procedure altitudes in mountainous regions (terrain of 3000 ft AMSL or higher)

2. Operators using baro-VNAV in an aircraft with an airworthiness approval for automatic temperature compensation, or in an aircraft using an alternate means for vertical guidance e.g. Satellite-Based Augmentation Systems (SBAS), may disregard the temperature limits (high temperature limit still applies if the system only compensates for low temperature).

### 3.8.1.7 Aircraft Size

Aircraft size may determine the minima for an RNP AR APCH procedure. Large aircraft may require higher minima due to gear height and/or wingspan. Approach charts will annotate any applicable aircraft size restrictions when appropriate.

### 3.8.2 Minimum Communication & ATS Surveillance

RNP AR APCH does not include specific requirements for communication or ATS surveillance.
3.8.3 Minimum Equipment List

The MEL must identify any unserviceability that affects the conduct of an RNP AR operation.

Redundancy is required for essential systems prior to dispatch ensuring that capability is maintained following a loss of any individual system. Where redundant equipment is unserviceable the MEL requirements are determined by consideration of the effect on the RNP operation caused by a loss of system availability taking into account any mitigating provisions incorporated in the procedure design or operating procedures.

3.8.4 Training & Knowledge Requirements

The operator must provide training for key personnel e.g. flight crew members and dispatchers in the use and application of RNP AR procedures. A thorough understanding of the operational procedures and best practices is critical to the safe operation of aircraft during RNP AR operations. The training programme must provide sufficient detail on the aircraft’s navigation and flight control systems to enable the pilots to identify failures affecting the aircraft’s RNP capability and the appropriate abnormal/emergency procedures. Required training must include both knowledge and skill assessments of the flight crew member (and dispatcher duties if applicable).

3.8.4.1 Flight Crew Training

The operator is responsible for the training of flight crews for the specific RNP AR operations approved for the operator. The operator must include training on the different types of RNP AR procedures and required equipment. Training must include discussion of RNP AR regulatory requirements. The operator must include these requirements and procedures in their operations manual and training manuals (as applicable). This material must cover all aspects of the operator’s approved RNP AR operations. An individual must have completed the appropriate ground and flight training segment before engaging in RNP AR operations.

Flight training segments must include training and checking modules representative of the type of RNP AR operations the operator conducts during line flying activities. The operator may conduct required flight training modules in Flight Training Devices, Aircraft Simulators, and other enhanced training devices as long as these training mediums accurately replicate the operator’s equipment and RNP AR operations.

The training requirements must be in accordance with the ICAO PBN Manual (Doc 9613) for RNP AR APCH, and in accordance with the requirements of the pilot’s license.

Refer to Appendix A for details on the Flight Crew Training Syllabus for RNP AR APCH.

3.8.4.2 Flight Dispatcher Training (if applicable)

Where flight dispatchers are utilised, training must include recognition of the different types of RNP AR procedures, the importance of specific navigation equipment and other equipment during RNP AR operations and discuss RNP AR regulatory requirements and procedures. Dispatcher procedure and training manuals must include these requirements (as applicable). This material must cover all aspects of the operator’s RNP AR operations including the applicable authorisation(s). An individual must have completed the appropriate training course before engaging in RNP AR operations. Additionally, the dispatchers’ training must address how to determine: RNP AR availability (considering aircraft equipment capabilities), MEL requirements, aircraft performance, and navigation signal availability e.g. GPS RAIM/predictive RNP capability tool for destination and alternate airports.
3.8.5 Navigation Database (NavDB)

The procedure stored in the navigation database (NavDB) defines the lateral and vertical path. NavDB updates occur every 28 days, and the navigation data in every update are critical to the integrity of every RNP AR procedure.

Given the reduced obstacle clearance associated with these procedures, validation of navigation data warrants special consideration.

An aircraft operator’s application to conduct RNP AR procedures must specifically describe the extent and nature of the services provided by an outside entity contracted to perform NavDB validation services.

The operator must implement procedures that ensure timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that require it.

3.8.5.1 NavDB Suppliers

The NavDB supplier must hold Type 2 LoA, or equivalent, issued by either EASA, FAA or Transport Canada. The Operator must hold a copy of the LoA.

Note:

(i) EASA Type 2 LoA is issued by EASA in accordance with EASA OPINION Nr. 01/2005 on “The Acceptance of Navigation Database Suppliers” dated 14 Jan 05.

(ii) The FAA Type 2 LoA in accordance with AC 20-153A.

(iii) Transport Canada (TCCA) issues an acknowledgement letter of an Aeronautical Data Process using the same basis.

3.8.5.2 NavDB Validation Programme

Any RNP AR procedure in the database must first be validated formally by the operator by:

(a) comparing the data in the database with the procedure published on the relevant approach chart. Any discrepancy must be compared against the respective State’s Aeronautical Information Publication (AIP);

(b) flying the entire procedure either in a simulator or in the actual aircraft in VMC, or using a desktop/laptop computer utilising software identical to the aircraft (e.g. FMS software) and use of an aerodynamic model of the aircraft’s flight characteristics to ensure that there is complete consistency and there are no disconnects;

(c) comparing subsequent database updates with the validated master to ensure that there are no discrepancies.

3.8.5.3 TAWS Database

The procedure validation process should include a compatibility check with the installed TAWS. The TAWS data must only be obtained from a qualified source and the operator must have a procedure in place for the management of the TAWS data.

3.8.6 Operational Criteria

This section provides guidance on the conduct of RNP AR APCH operations. In addition to this guidance, the operator must also continue to ensure its flight crews comply with
3.8.1 Pre-flight Considerations

(a) Minimum Equipment List (MEL)

The operator’s MEL must address the equipment requirements for RNP AR instrument approaches. Guidance related to these equipment requirements is available from the aircraft manufacturer. The required equipment may depend on the intended RNP value and whether the missed approach requires RNP less than 1.0;

(b) Class A Terrain Awareness Warning System (TAWS)

An operable TAWS Class A is required for all RNP AR procedures. The TAWS must use altitude that is compensated for local pressure and temperature effects e.g. corrected barometric and Global Navigation Satellite System (GNSS) altitude, and include significant terrain and obstacle data;

(c) Autopilot and Flight Director (FD)

RNP AR procedures with RNP values less than 0.3, or with radius to fix (RF) legs, require the use of autopilot or FD driven by the RNAV system in all cases. The autopilot/FD must operate with suitable accuracy to track the lateral and vertical paths required by the RNP AR procedure;

(d) RNP Prediction

The operator must have a predictive performance capability, which can forecast if the specified RNP value will be available at the time and location of a desired RNP AR operation. This capability can be a ground service and need not be resident in the aircraft’s avionics equipment. The operator must establish procedures requiring use of this capability as both a pre-flight dispatch tool and as a flight-following tool in the event of reported failures;

i. This predictive capability must account for known and predicted outages of GNSS satellites or other impacts on the aircraft navigation system. The prediction program should not use a mask angle below 5 degrees, as operational experience indicates that satellite signals at low elevations are not reliable. The prediction must use the actual GNSS constellation, and when equipped, the GNSS augmentations with the algorithm identical to or more conservative than that used in the actual equipment. The RNP prediction must show the horizontal protection level (HPL) is less than the required RNP value. For RNP AR procedure with high terrain, a mask angle appropriate to the terrain must be used;

ii. RNP AR procedures require GNSS updating. Therefore, there is no RNP prediction associated with distance measuring equipment (DME)/DME or very high frequency omni-directional radio range station (VOR)/DME updating of the aircraft’s RNAV system;
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(e) NAVAID Exclusion

The operator must establish procedures to exclude NAVAID facilities e.g. DMEs, VORs, localisers in accordance with NOTAMs. Internal avionics reasonableness checks may not be adequate for RNP AR operations;

(f) Navigation Database (NavDB) Currency

During system initialization, pilots must confirm the NavDB is current. NavDBs are expected to be current for the duration of the flight. If the Aeronautic Information Regulation and Control (AIRAC) cycle will change during flight, operators must establish procedures to ensure the accuracy of navigation data, including suitability of navigation facilities used to define the routes and procedures for flight. Traditionally, this has been accomplished by verifying electronic data against paper products. One acceptable means is to compare aeronautical charts (new and old) to verify navigation fixes prior to dispatch. If an amended chart is published for the procedure, the RNP AR procedure must not be carried out with the expired NavDB, and,

(g) Flight Planning

The flight crew must ensure that the ATC Flight Plan includes:

- ‘R’ for PBN in item 10a; and
- PBN/T1 or T2 (as appropriate) to identify RNP AR APCH in item 18.

3.8.6.2 Flight Considerations

(a) Modification of Flight Plan

Pilots must not be authorised to fly a published RNP procedure unless it is retrievable by the procedure name from the aircraft navigation database and conforms to the charted procedure. The lateral path must not be modified; with the exception of accepting a clearance to go direct to a fix in the approach procedure that is before the final approach fix (FAF) and that does not immediately precede an RF leg. The only other acceptable modification to the loaded procedure is to change altitude and/or airspeed waypoint constraints on the initial, intermediate, or missed approach segments flight plan fixes e.g. to apply cold temperature corrections or comply with an ATC clearance/instruction;

(b) Required List of Equipment

The flight crew must have a readily accessible list of equipment required for conducting RNP AR APCH, as well as methods to address in-flight equipment failures that would prohibit RNP AR APCH e.g. crew warning systems, quick reference handbook;

(c) RNP Management

The flight crew’s operating procedures must ensure the navigation system uses the appropriate RNP values throughout the approach. If multiple lines of minima associated with different RNP values are shown on the approach chart, the flight crew must confirm that the required RNP value is entered in the RNAV system. If the navigation system does not extract and set the RNP value from the onboard
navigation database for each leg of the procedure, then the flight crew’s operating procedures must ensure that the most restrictive RNP value required to complete the approach or the missed approach is selected before initiating the approach e.g. before the initial approach fix (IAF). Different IAF’s may have different navigation accuracies, which are annotated on the approach chart;

(d) Sensor Updating

RNP AR instrument procedures require GNSS performance. If at any time GNSS updating is lost and the navigation system does not have the performance to continue the approach, i.e. unable to comply with the current RNP value the flight crew must abandon the RNP AR procedure unless visual conditions exist between the aircraft and the runway of intended landing;

Initiation of all RNP AR procedures is based on GNSS updating. Except where specifically designated on a procedure as 'Not Authorised', DME/DME updating can be used as a reversionary mode during the approach or missed approach when the system complies with the navigation accuracy. VOR updating is not authorised at this time. The flight crew must comply with the operator’s procedures for inhibiting specific facilities;

(e) Approach Procedure Confirmation

The flight crew must confirm the correct procedure has been selected. This process includes confirmation of the waypoint sequence, reasonableness of track angles and distances, and any other parameters that can be altered by the pilot, such as altitude or speed constraints. A RNP AR procedure must not be used if validity of the NavDB is in doubt. A navigation system textual display or map display must be used for this procedure confirmation;

(f) Track Deviation Monitoring

The flight crew must use a lateral deviation indicator, flight director and/or autopilot in lateral navigation (LNAV) mode on RNP AR procedures. The flight crew of aircraft with a lateral deviation indicator must ensure that lateral deviation indicator scaling (full scale deflection) is suitable for the navigation accuracy associated with the various segments of the RNP AR procedure. All flight crew are expected to maintain procedure centrelines, as depicted by onboard lateral deviation indicators and/or flight guidance during all RNP AR operations unless authorised to deviate by ATC or under emergency conditions.

For normal operations, pilots must limit cross-track error/deviation (the difference between the RNP system computed path and the aircraft position relative to the path) to +/- one half the navigation accuracy associated with the procedure segment. Brief lateral deviations from this standard e.g. overshoots or undershoots during and immediately after turns, up to a maximum of 1 times the navigation accuracy of the procedure segment, are allowable.

Vertical deviation must be monitored above and below the glidepath;

The vertical deviation must be within ±75 feet of the glidepath during the final approach segment.
Flight crew must execute a missed approach (MAP) if the lateral deviation exceeds 1xRNP or the vertical deviation exceeds 75 feet, unless the pilot has in sight the visual references required to continue the approach.

i. Some aircraft navigation displays do not incorporate lateral and vertical deviation indications, scaled for each RNP AR APCH operation, in the primary optimum field of view (FOV). Where a moving map, low resolution vertical deviation indicator (VDI), or numeric display of deviations are to be used, flight crew training and procedures must ensure the effectiveness of these displays. Typically, this involves demonstration of the procedure with a number of trained crews and inclusion of this monitoring procedure in the recurrent RNP AR APCH training programme; and

ii. For installations that use a CDI for lateral path tracking, the aircraft flight manual (AFM) or aircraft qualification guidance should state which navigation accuracy and operations the aircraft supports and the operational effects on the CDI scale. The flight crew must know the CDI full scale deflection value.

The avionics may automatically set the CDI scale (dependent on phase of flight) or the flight crew may manually set the scale. If the flight crew manually selects the CDI scale, the operator must have procedures and training in place to assure the selected CDI scale is appropriate for the intended RNP operation. The deviation limit must be readily apparent given the scale e.g. full scale deflection.

(g) System Crosscheck

For approaches with RNP value less than RNP 0.3, the flight crew must ensure the lateral and vertical guidance provided by the navigation system is consistent with other available data and displays provided by an independent means;

Note
This crosscheck may not be necessary if the lateral and vertical guidance systems have been developed and/or evaluated consistent with extremely remote failure conditions and if the normal system performance supports 1 x RNP containment.

(h) Procedures with RF Legs

An RNP AR procedure may include an RF leg. As not all aircraft have this capability, flight crews must know if they can conduct these procedures. When flying an RF leg, flight crew compliance with the desired path is essential to maintain the intended ground track;

i. If initiating a go-around during or shortly after the RF leg, the flight crew must be aware of the importance of maintaining the published path as closely as possible. Operators must develop specific procedures to ensure maintenance of the RNP AR ground track in those aircraft which do not remain in LNAV upon initiation of a go-around; and

ii. Pilots must not exceed the maximum airspeeds shown in the table below throughout the RF leg segment. For example, a Category (CAT) C aircraft must slow to 140 knots indicated airspeed (KIAS) at the FAF or may fly as fast as 165 KIAS if using CAT D minima. A missed approach prior to Decision
Altitude (DA) requires maintaining the segment speed to the DA and then observing any speed limitations specified for the missed approach segment.

### Maximum Airspeed by Segment and Category

<table>
<thead>
<tr>
<th>Segment</th>
<th>Indicated Airspeed (Knots)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cat A</td>
</tr>
<tr>
<td>Initial and Intermediate (IAF to FAF)</td>
<td>150</td>
</tr>
<tr>
<td>Final (FAF to DA)</td>
<td>90</td>
</tr>
<tr>
<td>Missed Approach (DA to MAHP)</td>
<td>110</td>
</tr>
<tr>
<td>Airspeed Restriction$^1$</td>
<td>As specified</td>
</tr>
</tbody>
</table>

$^1$ Airspeed Restriction: Airspeed restrictions may be used to reduce turn radius regardless of aircraft category.

**Note**

EASA AC 20-26 and AC 90-101A do not agree on some speed categories. The most restrictive speed has been selected for this table.

(i) Temperature Compensation

For aircraft with temperature compensation, flight crews may disregard the temperature limits on RNP procedures if the operator provides pilot training on the use of the temperature compensation function. Temperature compensation by the system is applicable to the VNAV guidance and is not a substitute for the flight crew compensating for the cold temperature effects on minimum altitudes or the decision altitude. Flight crews must be familiar with the effects of the temperature compensation on intercepting the compensated path described in EUROCAE ED-75B/ RTCA DO-236B Appendix H;

**Note**

As the charted temperature limits ensure obstacle clearance solely in the FAS, and since temperature compensation only affects the vertical guidance, the pilot may need to manually adjust the minimum altitude on the initial and intermediate approach segments and the DA. Pilots must coordinate with ATC prior to use of temperature compensation in order to prevent loss of aircraft separation.
(j) Altimeter Setting

Due to the performance based obstruction clearance inherent in RNP instrument procedures, the flight crew must verify the most current airport altimeter setting is selected prior to the final approach fix (FAF). Operators must take precautions to switch altimeter settings at appropriate times or locations and request a current altimeter setting if the reported setting may not be recent, particularly at times when pressure is reported or is expected to be rapidly decreasing. Execution of an RNP instrument procedure requires the current altimeter setting for the airport of intended landing. Remote altimeter settings are not allowed;

(k) Altimeter Crosscheck

The flight crew must complete an altimetry crosscheck ensuring both pilots’ altimeters agree within ±100 feet prior to the final approach fix (FAF) but no earlier than when the altimeters are set for the airport of intended landing. If the altimetry crosscheck fails then the procedure must not be continued;

Note

This operational crosscheck is not necessary if the aircraft systems automatically compare the altitudes to within 75 feet.

(l) Go-Around or Missed Approach

Where possible, the missed approach will require RNP 1.0. The missed approach portion of these procedures is similar to a missed approach of an RNP APCH procedure. Where necessary, navigation accuracy less than RNP 1.0 will be used in the missed approach. To be approved to conduct these approaches, aircraft equipment and procedures must meet aircraft certification requirements for approaches with missed approach less than RNP 1.0. This information should be included in the AFM;

i. In many aircraft when executing a go-around or missed approach activating Take-off/Go-around (TOGA) may cause a change in lateral navigation. In many aircraft, activating TOGA disengages the autopilot and flight director from LNAV guidance, and the flight director reverts to trackhold derived from the inertial system. LNAV guidance to the autopilot and flight director should be re-engaged as quickly as possible;

ii. The flight crew procedures and training must address the impact on navigation capability and flight guidance if the pilot initiates a go-around while the aircraft is in a turn. When initiating an early go-around, the flight crew should follow the rest of the approach track and missed approach track unless issued a different clearance by ATC. The flight crew should also be aware that RF legs are designed based on the maximum true airspeed at normal altitudes, and initiating an early go-around will reduce the manoeuvrability margin and potentially even make holding the turn impractical at missed approach speeds; and

iii. Upon loss of GNSS updates, the RNAV guidance may begin to “coast” on the IRU, if installed, and drift, degrading the navigation position solution. Thus, when the RNP AR procedures missed approach operations rely on IRU
“coasting” the inertial guidance can only provide acceptable navigation performance for a specified amount of time.

(m) Contingency Procedures

i. Failure while En-Route

The aircraft RNP capability is dependent on operational aircraft equipment and GNSS satellites. The flight crew should be able to assess the impact of equipment failure on the anticipated RNP approach and take appropriate action; and

ii. Failure on Approach

The operator’s contingency procedures must address at least the following conditions:

1) Failure of the RNP system components, including those affecting lateral and vertical deviation performance e.g. failures of a GPS sensor, the flight director or automatic pilot.

2) Loss of navigation signal-in-space (loss or degradation of external signal).

(n) Engine Out Procedures

Aircraft may demonstrate acceptable flight technical error with one engine inoperative to conduct RNP AR operations. Otherwise, flight crews are expected to take appropriate action in event of engine failure during an approach so that no specific aircraft qualification is required. The aircraft qualification should identify any performance limits in event of engine failure to support definition of appropriate flight crew procedures.

3.8.7 Monitoring Programme and Safety Management System (SMS)

The operator must include in their SMS an RNP AR monitoring programme to ensure continued compliance with the IOMAR requirements and to identify any negative trends in performance.

As a minimum, this programme must address the following information:

(a) Total number of RNP AR procedures conducted;

(b) Number of satisfactory approaches by aircraft/system (Satisfactory if completed as planned without any navigation or guidance system anomalies);

(c) Reasons for unsatisfactory approaches, such as:

i. UNABLE REQ NAV PERF, NAV ACCUR DOWNGRAD, or other RNP messages during approaches;

ii. Excessive lateral or vertical deviation;

iii. TAWS warning;

iv. Autopilot system disconnect;
v. Nav data errors;

vi. Pilot report of any anomaly; and

(d) Any pertinent crew comments.

The results of this monitoring programme will be required as part of the RNP AR APCH renewal process.

3.8.7.1 Reportable Events

A reportable event is one that adversely affects the safety of the operation and may be caused by actions/events external to the operation of the aircraft navigation system. The operator must investigate such events to determine if it is due to an improperly coded procedure, or a navigation data base error. Responsibility for initiating corrective and preventative action rests with the operator.

Technical defects and exceeding technical limitations should be subject to occurrence reports, including:

i. Significant navigation errors attributed to incorrect data or a database coding error;

ii. Unexpected deviations in lateral/vertical flight path not caused by pilot input or erroneous operation of equipment;

iii. Significant misleading information without a failure warning;

iv. Total loss or multiple navigation equipment failure; and

v. Loss of integrity e.g. RAIM function where integrity was predicted to be available during the pre-flight planning.

In all cases, the Pilot-in-Command or Operator must ensure an Occurrence Report is submitted to the Registry.

3.8.7.2 Aircraft Modifications

If an aircraft system required for RNP AR operations is modified e.g. software or hardware change, the operator is responsible for validation of RNP AR procedures with the navigation database and the modified system. This may be accomplished without any direct evaluation if the manufacturer verifies that the modification has no effect on the navigation database or path computation. If no such assurance from the manufacturer is available, the operator must conduct initial database validation with the modified system.

3.8.8 Application Process

The successful RNP AR application is one that addresses each requirement shown in Section 3.8 of this Registry Publication. Operators need to evidence that their aircraft meets the performance requirements and that they have adjusted their operating procedures and training programmes to take into account each of the procedural and training requirements as applicable. Operators are not required to submit entire flight crew operating and training manuals but rather should provide copies of those portions of the manuals that have been amended to reflect the specific RNP AR APCH requirements;

3.8.8.1 Application Form

Operators seeking operational approval to conduct RNP AR APCH procedures must provide their request for RNP AR APCH approval and the following information using Form 19.
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The operator must specify the airport, RNP Value and approach designator on the application form.

Upon satisfactory completion of the approval process, the Registry will issue an RNP AR APCH Approval restricted to use on the specific approach procedure(s) identified on the application form.

3.8.8.2 Acceptable Means of Compliance for Approval of RNP AR APCH

The operator must supply the following supporting documentation: -

- AFM (or AFM Supplement) evidencing RNP AR APCH Certification.
  
The Operator must provide documentation from the aircraft manufacturer showing the proposed aircraft equipment meets the airworthiness requirements for RNP AR APCH. This documentation must contain any specific hardware or software equipment requirements, procedural requirements, or limitations;
  
  Alternatively, if a statement of compliance with any of the following specifications or standards is found in any of the document listed in 3.0.1.1 Acceptable Document for Demonstration of Compliance, the aircraft is eligible for RNP AR APCH operations: -
  
  (a) SAAAR; and
  
  (b) AMC 20-26.

- Standard Operating Procedures
  
The Operator must submit those portions of the Aircraft Flight Manual and required supplements which specifically relate to RNP AR performance along with any relevant operations manual entries;

- Flight Crew Training
  
The Operator must provide copies of RNP AR APCH training syllabus and completion certificates for each trained pilot;

- RNP AR Procedure Charts
  
The Operator must provide copies of the RNP AR procedure charts for each approach requested;

- Navigation Database Validation Programme
  
The operator must describe its programme for collecting data on RNP AR operations; and

- Minimum Equipment List
  
The operator must document the revisions to the MEL to account for RNP AR APCH minimum equipment requirements.
Appendix A  RNP AR APCH Flight Crew Training Syllabus

A.1  Ground Training

Ground training segments must address the following subjects as training modules in approved RNP AR academic training during the initial introduction of a crew member to RNP AR systems and operations. For recurrent programmes, the curriculum need only review initial curriculum requirements and address new, revised, or emphasised items.

A.1.1  General Concepts

RNP AR ground training must cover RNP AR systems theory to the extent appropriate to ensure proper operational use. Flight crews must understand basic concepts of RNP AR systems operation, classifications, and limitations. The training must include general knowledge and operational application of RNP AR instrument approach procedures. This training module must address the following specific elements:

(a) Definitions of RNAV, RNAV (GPS)/RNAV (GNSS), RNP, RNP AR, RAIM, and containment areas;

(b) The differences between RNAV and RNP;

(c) The types of RNP AR procedures and familiarity with the charting of these procedures;

(d) The programming and display of RNP and aircraft specific displays e.g. Actual Navigation Performance;

(e) How to enable and disable the navigation updating modes related to RNP;

(f) RNP values appropriate for different phases of flight and RNP AR instrument procedures and how to select (if required);

(g) The use of GPS RAIM (or equivalent) forecasts and the effects of RAIM "holes" on RNP AR procedures (flight crew and dispatchers);

(h) When and how to terminate RNP navigation and transfer to traditional navigation due to loss of RNP and/or required equipment;

(i) How to determine if the FMC database is current and contains required navigational data;

(j) Explanation of the different components that contribute to the total system error and their characteristics e.g. effect of temperature on Baro-VNAV, drift characteristics when using IRU with no radio updating, considerations in making suitable temperature corrections for altimeter systems;

(k) Temperature Compensation. Flight crews operating avionics systems with compensation for altimetry errors introduced by deviations from ISA may disregard the temperature limits on RNP AR procedures, if pilot training on use of the temperature compensation function is provided by the operator and the compensation function is utilised by the crew. However the training must also recognise the temperature compensation by the system is applicable to the VNAV guidance and is not a substitute for the flight crew compensating for the cold temperature effects on minimum altitudes or the decision altitude;
(l) The effect of wind on aircraft performance during RNP AR procedures and the need to positively remain within RNP containment area, including any operational wind limitation and aircraft configuration essential to safely complete an RNP AR procedure;

(m) The effect of groundspeed on compliance with RNP AR procedures and bank angle restrictions that may impact the ability to remain on the course centreline. For RNP procedures aircraft are expected to maintain the standard speeds associated with the applicable category;

(n) Relationship between RNP and the appropriate approach minima line on an approved published RNP AR procedure and any operational limitations if the available RNP degrades or is not available prior to an approach (this should include flight crew procedures outside the FAF versus inside the FAF);

(o) Understanding alerts that may occur from the loading and use of improper RNP values for a desired segment of an RNP AR procedure;

(p) Understanding the performance requirement to couple the autopilot/flight director to the navigation system’s lateral guidance on RNP AR procedures requiring an RNP of less than RNP 0.3;

(q) The events that trigger a missed approach when using the aircraft’s RNP capability to complete an RNP AR procedure;

(r) Any bank angle restrictions or limitations on RNP AR procedure; and

(s) Ensuring flight crews understand the performance issues associated with reversion to radio updating, know any limitations on the use of DME and VOR updating.

A.1.2 ATC Communication and Coordination

Ground training must instruct the flight crews on proper flight plan classifications and any Air Traffic Control (ATC) procedures applicable to RNP AR operations. The flight crews must receive instruction on the need to advise ATC immediately when the performance of the aircraft’s navigation system is no longer suitable to support continuation of an RNP AR procedure. Flight crews must also know what navigation sensors form the basis for their RNP AR compliance, and they must be able to assess the impact of failure of any avionics or a known loss of ground systems on the remainder of the flight plan.

A.1.3 RNP AR Equipment Components, Controls, Displays, and Alerts

Ground training must include discussion of RNP terminology, symbology, operation, optional controls, and display features including any items unique to an operator’s implementation or systems. The training must address applicable failure alerts and limitations. The flight crews and dispatchers should achieve a thorough understanding of the equipment used in RNP operations and any limitations on the use of the equipment during those operations.

A.1.4 AFM Information and Operating Procedures

The AFM or other operations manual must address normal and abnormal flight crew operating procedures, responses to failure alerts, and any limitations, including related information on RNP modes of operation. Training must also address contingency procedures for loss or degradation of RNP capability. The operations manuals approved for
use by the flight crews e.g. Flight Crew Operations Manual (FCOM) or Pilot Operating Handbook (POH)) should contain this information.

A.1.5 MEL Operating Provisions

Flight crews must have a thorough understanding of the MEL requirements supporting RNP AR operations.

**A.2 Simulator Training**

In addition to the ground training, the flight crews must receive appropriate operational use training and experience of the actual RNP AR approaches being applied for. Training programmes must cover the proper execution of RNP AR procedures in consultation with the OEM’s documentation.

The operational training must include:

(a) RNP AR procedures and limitations;

(b) Standardisation of the setup of the cockpit’s electronic displays during an RNP AR procedure;

(c) Recognition of the aural advisories, alerts and other annunciations that can impact compliance with an RNP AR procedure;

(d) Timely and correct responses to loss of RNP AR capability in a variety of scenarios embracing the breadth of the RNP AR procedures the operator plans to complete; and

(e) Experience the RNP AR approaches requested. This can be achieve by either:

(f) Using a flight training simulator with an accurate model, a minimum of:
   - 1 approach in VMC, followed by
   - 2 in IMC with a go-around at some stage in the approach.

   Note: If no accurate model exists for the approach and aircraft type, please contact the Registry.

   Or,

   If the operator has CBT training which contains accurate approach details, obstacles, charting and procedures then this should be completed prior to operating at least 1 approach as a crew at the airport in VMC before operating in IMC.

Such training may also use approved flight training devices or simulators, and must address the following specific elements:

3) Procedures for verifying that each pilot’s altimeter has the current setting before beginning the final approach of an RNP AR procedure, including any operational limitations associated with the source(s) for the altimeter setting and the requirement for checking and setting the altimeters for landing;

4) Use of aircraft RADAR, TAWS, GPWS, or other avionics systems to support the flight crew’s track monitoring and weather and obstacle avoidance;
5) Concise and complete flight crew briefings for all RNP AR procedures and the important role Cockpit Resource Management (CRM) plays in successfully completing an RNP AR procedure;

6) The importance of aircraft configuration to ensure the aircraft maintains any required speeds during RNP AR procedures;

7) The potentially detrimental effect of reducing the flap setting, reducing the bank angle or increasing airspeeds may have on the ability to comply with an RNP AR procedure;

8) Develop flight crew knowledge and skills necessary to properly conduct RNP AR operations (RNP AR Procedure Training);

9) Ensure flight crews understand and are capable of programming and operating the FMC, autopilot, autothrottles, RADAR, GPS, INS, EFIS (including the moving map), and TAWS in support of RNP AR procedures;

10) Handling of TOGA while in a turn;

11) Monitoring of FTE and related go-around operation;

12) Handling of loss of GPS during a procedure; and

13) Flight crew contingency procedures for a loss of RNP capability during a missed approach. Due to the lack of navigation guidance, the training must emphasise the flight crew contingency actions that achieve separation from terrain and obstacles. The operator must tailor these contingency procedures to their specific, approved RNP AR procedures.

### A.3 Recurrent Training

The operator must incorporate recurrent RNP training that employs the unique AR characteristics of the operator’s approved procedures as part of the overall programme.

A minimum of two RNP AR procedures must be flown by each pilot for each duty position (pilot flying and pilot monitoring), with one culminating in a landing and one culminating in a missed approach, and may be substituted for any required “precision like” approach.

One of the above approaches will include either an interrupted approach resulting in vectors to resume the approach or a hold at an IAF or transition fix.
Chapter 4: ATS Comms & Surveillance Operating Approvals

4.1 FANS 1/A

FANS 1/A is Future Air Navigation System 1A which comprises of ADS-C and CPDLC (see below).

Some of the benefits are:
- Fewer delays on the ground while awaiting clearance
- Fully automated oceanic position reporting (ADS-C)
- Increased safety - improved controller awareness of aircraft position
- Better oceanic communications quality vs. noisy HF
- Reduction in errors between pilots and controllers
- Allows the flight crew to re-view and print clearances
- Preferred, more direct oceanic routing
- Reduced separation both laterally and longitudinally
- Route clearances automatically made in flight plan
- HF used as a backup

4.1.0.1 CPDLC

CPDLC is a data link application that supports the exchange of data messages directly between a controller and a flight crew.

Frequency congestion on sector frequencies is a well-known constraint. Voice communication tasks represent between 35% and 50% of the tactical (executive) controller’s overall workload.

The use of a supplementary communication medium like CPDLC offers the potential to relieve some congestion, enhancing existing communications between the air and the ground, and offering unambiguous transmission of routine messages between controllers and pilots. In addition, shortcomings such as stuck microphones, blocking of frequencies or simultaneous transmissions are avoided, contributing to the overall safety of the ATC system. CPDLC contributes to reducing the pilot’s and the air traffic controller’s communication workload, and allows them to concentrate on other essential tasks.

4.1.0.2 ADS-C (Automatic Dependent Surveillance — Contract)

ADS-C uses various systems on board the aircraft to automatically provide aircraft position, altitude, speed, intent and meteorological data, which can be sent in a report to an ATSU or AOC facility ground system for surveillance and route conformance monitoring.

One or more reports are generated in response to an ADS contract, which is requested by the ground system. An ADS contract identifies the types of information and the conditions under which reports are to be sent by the aircraft. Some types of information are included in every report, while other types are provided only if specified in the ADS contract request. The aircraft can also send unsolicited ADS-C emergency reports to any ATSU that has an ADS contract with the aircraft.

4.1.1 FANS 1/A Application Process

To apply for FANS 1/A, the operator should complete the appropriate section of Form 4 together with a copy of the AFM Limitations Section or AFM supplement showing a statement of compliance that the aircraft is certificated for FANS 1/A. The submission must
include any relevant supporting documentation to evidence embodiment of the required equipment.

4.1.2  **FANS 1/A Declaration Statement**

When signing the declaration on Form 4 & Form 4a, you are confirming that:

- the aircraft is equipped with systems ensuring compliance to conduct data link communications during flight operations;
- procedures are in place that meet the specific operational criteria for airspace where FANS 1/A is mandatory and flight crews are suitably trained and competent to operate the data link communication equipment;
- appropriate procedures have been instituted in respect of continuing airworthiness to ensure continued conformity and the MEL amended accordingly;
- the declaration is made with reference to FAA AC 90-117() and the ICAO Global Operational Data Link Document (GOLD) Second Edition-26 April 2013 or latest revision;
- Satellite Communications equipment is installed on the above aircraft for the transmission of data link communications; and
- a valid Aircraft Radio License that includes Satellite Communication transmitting approval frequencies is carried onboard the aircraft.

4.2  **FANS 1/A+ (PBCS)**

FANS 1/A+ (PBCS) is an enhanced version of FANS 1/A that includes a message latency monitor.

FANS 1/A+ (PBCS) approval is required in order to demonstrate compliance with Performance Based Communication and Surveillance (PBCS).

Performance-based communication and surveillance (PBCS) is a concept that applies required communication performance (RCP) and required surveillance performance (RSP) specifications to ensure appropriate performance levels for relevant ATM operations (e.g. application of a reduced separation minimum). Information on the performance based communication and surveillance (PBCS) concept and guidance material on its implementation are contained in ICAO Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).

4.2.1  **FANS 1/A+ (PBCS) Application Process**

To apply for FANS 1/A+ (PBCS), the operator should complete the appropriate section of Form 4 together with a copy of the AFM Limitations Section or AFM supplement showing a statement of compliance that the aircraft is certificated for FANS 1/A+ (CPDLC with the RCP value and ADS-C with the RSP Value).

The submission must include any relevant supporting documentation to evidence embodiment of the required equipment together with a written statement of compliance from the aircraft manufacturer.

4.2.2  **FANS 1/A+ (PBCS) Declaration Statement**

When signing the declaration on Form 4 & Form 4a, you are confirming that:

- the aircraft communication and surveillance equipment meets the prescribed RCP and RSP specification(s);
- procedures are documented that meet the specific operational criteria for airspace where FANS 1/A+ (PBCS) is mandatory and flight crews are suitably trained and competent to operate the data link communication equipment;

- appropriate procedures have been instituted in respect of continuing airworthiness to ensure continued conformity and the RCP/RSP specification capabilities are included in the MEL;

- participation, in accordance with the ICAO PBCS Manual 9869, with applicable local and regional PBCS monitoring programmes have been entered into, and the following information have been provided to the appropriate PBCS monitoring entities specified in AIPs (or equivalent publications):
  - operator name;
  - operator contact details; and
  - other coordination information.
  Note: details of the PBCS monitoring procedures are still under discussion and will be made available in due course by the relevant authorities.

- procedures have been established for the reporting of problems, identified either by the flight crew or other personnel, to the appropriate PBCS monitoring entities associated with the route of flight on which the problem occurred;

- procedures have been established for the timely disclosure and delivery of operational data, including data from its CSPs/SSPs, to the appropriate PBCS monitoring entity when requested for the purposes of investigating a reported problem.

- contractual arrangements have been established with Communications Service Provider (CSP) and Satellite Service Provider (SSP).
  Note: An “alternate means of compliance” is for operators to sign up to the PBCS Global Charter using http://www.fans-cra.com/ where stakeholders can obtain proof of respective CSP signature, as required by approval process.

### 4.3 ATN B1

ATN B1 are ATS applications comprising of CM (Context Management) and CPDLC supported by Aeronautical Telecommunications Network baseline 1 (ATN B1) over an ATN network.

(a) Context management (CM) application for data link initiation capability (DLIC);

(b) CPDLC for ATC communications management (ACM), ATC clearance (ACL), and ATC microphone check (AMC).

#### 4.3.1 CPDLC

Refer to 4.1.0.1.

#### 4.3.2 Application Process

To apply for ATN B1, the operator should complete the appropriate section of Form 4 together with a copy of the AFM Limitations Section or AFM supplement showing a statement of compliance that the aircraft is certificated for ATN B1. The submission must include any relevant supporting documentation to evidence embodiment of the required equipment.

#### 4.3.3 ATN B1 Declaration Statement

When signing the declaration on Form 4 & Form 4a, you are confirming that: -
- the aircraft is equipped with systems ensuring compliance to conduct data link communications during flight operations;
- procedures are in place that meet the specific operational criteria for airspace where ATN B1 is mandatory and flight crews are suitably trained and competent to operate the data link communication equipment;
- the ATC Data Link system has been demonstrated to comply with all applicable safety, performance and interoperability requirements;
- appropriate procedures have been instituted in respect of continuing airworthiness to ensure continued conformity and the MEL amended accordingly; and
- the declaration is made with reference to the ICAO Global Operational Data Link Document (GOLD) Second Edition-26 April 2013 or latest revision.

4.4 ADS-B – OUT

An ADS-B – Out capable aircraft supports ATS surveillance services and broadcasts information at a relatively high rate, and any appropriate receiver on the ground or in another aircraft within range can receive the information.

4.4.1 Application Process

To apply for ADS-B – Out, the operator should complete the appropriate section of Form 4 together with a copy of the AFM Limitations Section or AFM supplement showing a statement of compliance that the aircraft is certificated for ADS-B – Out. The submission must include any relevant supporting documentation to evidence embodiment of the required equipment.

4.4.2 ADS-B - OUT Declaration Statement

When signing the declaration on Form 4 & Form 4a, you are declaring that:

- the aircraft is equipped with systems ensuring compliance to conduct Automatic Dependent Surveillance – Broadcast (ADS-B) Operations;
- procedures are in place that meet the specific operational criteria for airspace where ADS-B is mandatory and flight crews are suitably trained and competent to operate the ADS-B equipment;
- appropriate procedures have been instituted in respect of continuing airworthiness to ensure continued conformity and the MEL amended accordingly; and
- the declaration is made with reference to FAA AC 20-165B or latest revision and/or EASA AMC 20-24 (ADS-B NRA) or latest revision.
Chapter 5: Miscellaneous Operating Approvals

5.1 90 Day Master Minimum Equipment List Permission

Large and TurboJet Aircraft joining the Registry are legally required to have an MEL approved by the IOMAR in accordance with Article 99M in order to operate. To enable continued operation of the aircraft the Registry will consider an application from an aircraft operator to use the Master Minimum Equipment List (MMEL) for up to a maximum of 90 days from date of the issue of the Permission.

This time frame allows for the preparation of an MEL, submission to the IOMAR for approval, and any recommended changes, if required, following the review by a Surveyor.

The Registry’s standard service level agreement to review and approve an MEL is 20 working days; therefore please ensure that the correctly prepared MEL is submitted to the Registry with sufficient time for the review and approval process to be completed. When preparing your MEL, please use the latest version of the MMEL referred to on the 90 day MMEL Permission Certificate.

5.1.1 Application Process

Operators wishing to apply for a MMEL 90-Day Permission need to submit to the Aircraft Registry the following documents: -

- Completed Form 15 Master Minimum Equipment List (MMEL) 90 Day Permission Application.
- Electronic copy of the front page of the MMEL.

The IOMAR will only grant a Permission for the use of an MMEL approved by the national aviation authority which approved the Type Certificate of the aircraft.

A copy of Schedule 3 Aircraft Equipment and Schedule 4 Radio Communication and Radio Navigation Equipment of Aircraft must be carried and consulted for guidance when the statements such as “Refer to National Requirements” is made in the “Remarks or Exceptions” column of the MMEL.
Chapter 5.2 – Minimum Equipment List

5.2 Minimum Equipment List

5.2.1 Introduction

Most aircraft are designed and certified with a significant amount of equipment redundancy, such that the airworthiness requirements are satisfied by a substantial margin.

A **Master Minimum Equipment List (MMEL)** is developed by the aircraft manufacturer and is usually prepared and approved as part of the Type Certification process. The MMEL includes those items related to airworthiness, air operations, airspace etc. which may be inoperative and yet maintain an acceptable level of safety by appropriate conditions and limitations; it does not contain obviously required items such as wings, flaps, and rudders. In order to maintain an acceptable level of safety, the MMEL establishes limitations on the duration of and conditions for operation with inoperative items.

A **Minimum Equipment List (MEL)** is developed by the operator based upon the MMEL taking into consideration their particular aircraft equipment configuration and their type and area of operation.

The philosophy behind the MEL is to authorise the release to service of the aircraft for flight with inoperative equipment only when the inoperative equipment does not render the aircraft unairworthy for the particular flight.

The IOMAR will only approve an MEL which is based on the MMEL approved by the national aviation authority which approved the Type Certificate of the aircraft.

5.2.1.1 Legal and Regulatory Basis

The Isle of Man Aircraft Registry will approve an MEL under the following legal and regulatory basis.

5.2.1.2 Air Navigation (Isle of Man) Order 2015 as amended (ANO)

**Article 35**

In accordance with Article 35, no aircraft registered in the Isle of Man may commence a flight if any of the equipment required by, or under the Order is not carried or is not in a fit condition for use, unless a Permission to do so has been issued by the Isle of Man Aircraft Registry (IOMAR). The IOMAR carries out its obligations under the terms of this Article by authorising the use of MELs. Any such permission will in no circumstances permit operations outside the constraints of the MMEL. In the context of this document, the term ‘MMEL’ should be interpreted to mean MMEL or MMEL Supplement.

By approving an MEL the IOMAR is providing the required permission.

**Article 99M**

Article 99M requires the operator of an aircraft registered in the Isle of Man which have any of the following characteristics:-

d) a maximum total mass authorised exceeding 5,700 kg;

e) one or more turbojet engines;

f) a seating configuration of more than 9 passenger seats.

Of a type that has a MMEL established must prepare and ensure that a MEL for the aircraft is approved by the IOMAR and include the details of the MEL procedures in the company operations manual.
5.2.1.3  **ICAO Annex 6 Part II (Attachment 3.B)**

If deviations from the requirements of States in the certification of aircraft were not permitted, an aircraft could not be flown unless all systems and equipment were operable. Experience has proved that some unserviceability can be accepted in the short term when the remaining operative systems and equipment provide for continued safe operations.

The State should indicate through approval of a minimum equipment list those systems and items of equipment that may be inoperative for certain flight conditions with the intent that no flight can be conducted with inoperative systems and equipment other than those specified.

A minimum equipment list, approved by the State of Registry is recommended for each aircraft, based on the master minimum equipment list established for the aircraft type by the organization responsible for the type design in conjunction with the State of Design.

The State of Registry requires the operator to prepare a minimum equipment list designed to allow the operation of an aircraft with certain systems or equipment inoperative provided an acceptable level of safety is maintained for large and turbojet aircraft.

The minimum equipment list is not intended to provide for operation of the aircraft for an indefinite period with inoperative systems or equipment. The basic purpose of the minimum equipment list is to permit the safe operation of an aircraft with inoperative systems or equipment within the framework of a controlled and sound programme of repairs and parts replacement.

Operators are to ensure that no flight is commenced with multiple minimum equipment list items inoperative without determining that any interrelationship between inoperative systems or components will not result in an unacceptable degradation in the level of safety and/or undue increase in the flight crew workload.

The exposure to additional failures during continued operation with inoperative systems or equipment should also be considered in determining that an acceptable level of safety is being maintained. The minimum equipment list may not deviate from requirements of the flight manual limitations section, emergency procedures or other airworthiness requirements of the State of Registry or of the State of the Operator unless the appropriate airworthiness authority or the flight manual provides otherwise.

Systems or equipment accepted as inoperative for a flight should be placarded where appropriate and all such items should be noted in the aircraft technical log or an equivalent document to inform the flight crew and maintenance personnel of the inoperative system or equipment.

For a particular system or item of equipment to be accepted as inoperative, it may be necessary to establish a maintenance procedure, for completion prior to flight, to deactivate or isolate the system or equipment. It may similarly be necessary to prepare an appropriate flight crew operating procedure.

The pilot-in-command is responsible for accepting an aeroplane for operation with deficiencies in accordance with the approved minimum equipment list.

5.2.1.4  **Initial MEL Approval**

Form 8 should be used to request approval for an operators MEL, together with all the required documentation as stipulated on the application form.

The MEL must be prepared in accordance with the standards set by the IOMAR, refer to 5.2.2, as the State of Registry.
Chapter 5.2 – Minimum Equipment List

The IOMAR will only approve an MEL which is based on the MMEL approved by the aviation authority which approved the Type Certificate of the aircraft.

Once approval has been granted by the IOMAR, the MEL approval will be added to the aircraft Operations Specification Certificate.

An MEL can take up to a maximum of 20 working days to review.

5.2.1.5 Operations outside the Scope of the MEL

The IOMAR may exempt an operator from compliance with the appropriate MEL on an individual case by case basis, provided such exemption complies with applicable limitations in the MMEL and AFM.

5.2.1.6 Non-Standard Operations

Aircraft are often flown for purposes other than those associated with their most common use. Such non-standard uses may well allow less stringent minimum equipment requirements. Examples of non-standard use may be:

a) Check Flights – after maintenance;

b) Training Flights; or

c) Positioning Flights – carrying neither passengers nor freight, to return the aircraft to a place for maintenance.

Any reference to a reduction in minimum equipment requirements in an MEL must be clearly labelled as such, together with the type of non-standard flight applicable.

Note: Such non-standard flights may only be undertaken if the aircraft Flight Manual contains the appropriate procedures and are agreed to by the IOMAR.

5.2.1.7 Dispatch with Inoperative Equipment

The MMEL and associated MEL are alleviating documents. Their purpose is not, however, to encourage the operation of aircraft with inoperative equipment. It is undesirable for aircraft to be dispatched with inoperative equipment and such operations are permitted only as a result of careful analysis of each item to ensure that the acceptable level of safety is maintained. A fundamental consideration is that the continued safe operation of an aircraft in this condition should be minimised. Refer to 5.2.2.4.2 for the limitations governing rectification intervals.

The pilot in command retains the option to decline the use of MEL alleviations, and may elect not to operate the aircraft with any particular MEL item inoperative.

5.2.1.8 Aircraft Affected By Other Civil Aviation Legislation (e.g. EASA Part-NCC)

Operators who are affected by other civil aviation legislation e.g. EASA Part-NCC, must ensure that their MEL primarily complies with the standards set by the IOMAR as the State of Registry.

Operators of non-EASA type certificate aircraft who are affected by Part-NCC are required under the EASA Air Operations Rules to ensure their MEL is no less restrictive than the EASA OSD MMEL.

In order to comply with both the State of Registry and state of operator requirements, the IOMAR will accept an MEL which is based on the MMEL approved by the aviation authority which approved the Type Certificate of the aircraft and is no less restrictive than the EASA OSD MMEL. Appendix 2 Preamble should be used in these circumstances.
5.2.2 MEL Preparation & IOMAR Standards

The MEL must be prepared in accordance with the IOMAR Standards contained within Chapter 5 of this RP.

5.2.2.1 MEL Concept

The MEL is a joint operational and maintenance document prepared by an aircraft operator to:

a) Identify the minimum equipment and conditions for an aircraft to maintain the validity of the Certificate of Airworthiness in force and to meet the operating rules for the intended flight;

b) Define operational and maintenance procedures necessary to maintain an acceptable level of safety and to deal with inoperative equipment.

5.2.2.2 MEL General Principles

When preparing the MEL, the operator must ensure that the correct MMEL is used as the source document.

The MEL must be no less restrictive than the MMEL on which it is based.

The Flight Operations Representative (FOR) is considered by the IOMAR to be responsible for the MEL.

FORs shall take operational and maintenance procedures referenced in the MMEL into account when preparing an MEL. The procedures themselves, or symbols to indicate them, are required in the operator’s MEL. (See 5.2.2.4.1 Operational and Maintenance Procedures (d) for acceptable means of compliance).

Where the MEL is prepared by a contractor, the FOR must ensure that the MEL is tailored to the specific aircraft and their operation.

The MEL must correctly reflect the modification status of the individual aircraft – please note fleet MELs are not permitted by the IOMAR.

Unless specifically permitted or accepted by the IOMAR, an inoperative item may not be removed from the aircraft.

a) Operational procedures shall be accomplished in planning for and/or operating with the listed item inoperative. Normally these procedures are accomplished by the flight crew; however, other personnel may be qualified and authorised to perform certain functions. The satisfactory accomplishment of all procedures, regardless of who performs them, is the responsibility of the operator.

b) Maintenance procedures shall be accomplished prior to operating with the listed item inoperative. Normally these procedures are accomplished by maintenance personnel; however, other personnel may be qualified and authorised to perform certain functions. The satisfactory accomplishment of all maintenance procedures, regardless of who performs them, is the responsibility of the operator.

MMEL cross-references to non-IOMAR regulations with numeric required quantities in the MEL (as identified from within Schedule 3, Aircraft Equipment and Schedule 4 Radio Communication and Radio Navigation Equipment of Aircraft) must be replaced.

5.2.2.3 MEL Structure

The MEL Manual sequence should follow the ATA 2200 classification:
Chapter 5.2 – Minimum Equipment List

a) List of Effective Pages;
b) Amendment record page.
c) Table of Contents;
d) Preamble, Notes and Definitions (refer to Appendix 1 or 2); and
e) List of minimum equipment required for PBN Airspace and/or AWOPS approvals held or where it can be found, i.e. Aircraft Flight Manual.

5.2.2.3.1 MEL Front Page

The front page of the MEL must identify the aircraft (serial number and/or registration) and operator.

5.2.2.3.2 MEL Manual Administration

The MEL must include: -

(a) List of Effective Pages

A List of Effective Pages must be used which lists the date of the last amendment for each page of the MEL. The date and revision status of each page of the MEL must correspond to that shown on the List of Effective Pages. 
Exception: Where the entire MEL is re-issued at each amendment AND it is produced in digital format, a List of Effective Pages is not required.

(b) Amendment Record Page

The MEL should include an amendment record page to reflect the changes implemented in the MEL.

(c) Table of Contents

The Table of Contents page should list the section for each aircraft system using the ATA 2200 listing as found in the MMEL.

5.2.2.3.3 Preamble

A preamble acceptable to the IOMAR is provided in Appendix 1.

FORs are strongly encouraged to use this preamble to ensure compliance with IOMAR standards.

Note: aircraft affected by EASA Part-NCC must use the preamble in Appendix 2 when the State of TCDS compliance is a state other than EASA (see 5.2.1.8 Aircraft Affected By Other Civil Aviation Legislation (e.g. EASA Part-NCC))

The preamble must include procedures for flight crews and maintenance personnel using the MEL.

5.2.2.3.4 Definitions

Definitions are required to allow the user to interpret the MEL properly.

Minimum definitions applicable to IOM registered aircraft are included in the IOMAR Preamble.
Chapter 5.2 – Minimum Equipment List

The FOR should review the definitions in the applicable MMEL and transcribe ONLY those which are relevant into the MEL.

5.2.2.3.5 List of Equipment Required for Specific Approvals

The MEL should identify the equipment, where applicable, that is required for specific approval(s) held, e.g. PBN, RVSM, NAT HLA (MNPS), & AWOPS etc or alternatively identify where it can be found. i.e. Aircraft Flight Manual.

5.2.2.4 MEL Content

The MEL must be fully customised to an individual aircraft specifications, and also clearly identify the operator.

Whilst the MMEL is for an aircraft type, the MEL must be tailored to the individual aircraft as such should include only the items listed in the MMEL which are applicable to the aircraft.

Operational Requirements must be determined by the Operator when preparing the MEL, taking into account the route structure, geographical location and availability of maintenance support. The MMEL cannot address these individual variables.

Throughout the MEL, terms such as "As required by Operational Requirements", "As per National Regulations", “Any in excess of those required...” or “Required Distribution...” will appear in the MMEL. These terms must not be included in the MEL.

5.2.2.4.1 Isle of Man National Regulations

The MMEL will either include the national regulations for that particular State or simple refer to “National Regulations”, "14 CFR” etc.

”National Regulations” etc., or “Any in excess of those required...” must be replaced with the applicable IOM National Regulations which are published in the ANO – Schedule 3 and Schedule 4.

To assist in meeting the Isle of Man National Regulations, FORs should refer to the Operational & Emergency Equipment page on our website.

Operational and Emergency Equipment Tables include guidance on the IOM National Requirements, Deferment Periods/Conditions and Required Distribution to meet our regulations.

Note: in some cases, the IOM Deferment Period may be more restrictive than the MMEL, e.g. ELT deferment period.

5.2.2.4.2 Operational and Maintenance Procedures

a) Dispatch with inoperative items is often acceptable only with the creation of special operational or maintenance procedures. Where the MMEL indicates that this is the case, the aircraft operator must establish appropriate procedures.

b) Procedures recommended by the Type Certificate Holder in most cases can be adopted for this purpose, but the ultimate responsibility for providing acceptable procedures with the MEL rests with the aircraft operator. These procedures will ensure that an acceptable level of safety will be maintained. The Type Certificate Holder produces operational and maintenance procedures such as Dispatch Deviation Guides, for use by aircraft operators. These procedures may be inserted into the appropriate MEL pages, and submitted by the aircraft operator to form part of the MEL. Dispatch Deviation Guides, and other similar documents are not approved by the IOMAR, nor can they
replace the MEL. If the Type Certificate Holder has not published operational or maintenance procedures, the aircraft operator should develop appropriate procedures.

c) Aircraft operators, when comparing their MEL against the MMEL, should ensure that where the (O) or (M) symbols appear, an operational or maintenance procedure has been developed that provides clear direction to crewmembers and maintenance personnel of the action to be taken. This procedure should be included in the MEL;

d) Alternatively, when the procedure is already contained in another document that is routinely available; e.g. elsewhere in the Operator’s Manuals for “(O)” procedures or the Maintenance Manual for “(M)” procedures, the MEL may refer to a section of the appropriate document;

e) Other than the examples c) and d), it is not acceptable to only make reference to other documents, as these may not be carried on board the aircraft and could be subject to misinterpretation. The objective is to provide personnel with clear, concise direction on how they are to proceed.

5.2.2.4.3 Rectification Interval Categories

The maximum time an aircraft may be operated between the deferral of an inoperative item and its rectification must be specified in the MEL. Non-safety related equipment such as reading lights and entertainment units need not be listed. However, if they are listed, they must include a rectification interval category. These items may be given a ‘D’ Category rectification interval provided any applicable (M) procedure (in the case of electrically supplied items) is applied – see paragraph 5.2.2.7 Non-Safety Related Equipment.

The Rectification Interval Categories are defined as follows:

**CATEGORY A**

No standard interval is specified, however, items in this category shall be rectified in accordance with the conditions stated in the MEL. Whenever the time interval is specified in calendar days, it shall start at 00:01 on the day following the day of discovery*.

**CATEGORY B**

Items in this category shall be rectified within three (3) consecutive calendar days, excluding the day of discovery*.

**CATEGORY C**

Items in this category shall be rectified within ten (10) consecutive calendar days, excluding the day of discovery*.

**CATEGORY D**

Items in this category shall be rectified as soon as is reasonably practical but within one hundred and twenty (120) consecutive calendar days, excluding the day of discovery*.

* - The day of discovery is defined as ‘Day of Discovery means the calendar day that a malfunction was discovered.’

5.2.2.5 Rectification Intervals

The operator shall take account of the Rectification Interval given in the MMEL when preparing an MEL. The Rectification Interval in the MEL shall not be less restrictive than the corresponding Rectification Interval in the MMEL.
Chapter 5.2 – Minimum Equipment List

The operator is responsible for establishing an effective rectification programme that includes tracking of the inoperative items and co-ordinating parts, personnel, facilities and procedures necessary to ensure timely rectification.

Operation of the aircraft is not allowed after expiry of the Rectification Interval specified in the MEL unless the defect has been rectified or with a Permission granted by the IOMAR 5.2.2.6 refers.

Where the applicable MMEL or MMEL Supplement does not contain Rectification Intervals, all such entries included within the MMEL shall be classified with a Rectification Interval category 'C' (relating to 10 calendar days, excluding the day of discovery) in the MEL, except where there is an existing repair limit stated within the proviso for a particular MMEL entry. The stated limit will remain in force but the entry should be identified as a category 'A' Rectification Interval in the MEL.

Once the applicable MMEL has been revised to include Rectification Intervals, this will supersede the guidance given in the paragraph above, and operators will need to reflect the rectification intervals in their MEL.

5.2.2.6 Rectification Interval Extension (RIE)

There is currently no provision to include a Repair Interval Extension for an existing deferment about to expire within an IOMAR approved MEL.

Therefore should an aircraft require to be operated with the known defect outside the rectification period specified in the MEL, contact should be made to the IOMAR prior to the expiry with all details for consideration for a Permission to be issued.

5.2.2.7 Non-Safety Related Equipment

Non-safety related equipment (sometimes referred to as Non-essential Equipment & Furnishings) includes those items related to the convenience, comfort, or entertainment of passengers. They may include items such as galley equipment, entertainment system, ashtrays, stereo equipment, and overhead reading lamps. Non-safety related equipment must not have an effect on the continued airworthiness or safe operation of the aircraft. This equipment does not require a rectification interval and need not be listed in an operator's MEL if it is not addressed in the MMEL. If an aircraft operator chooses to list this equipment in the MEL, it may be given a ‘D’ Category rectification interval. The exceptions to this rule are:

a) Where non-safety related equipment serves a second function, such as entertainment system being used for passenger briefings, aircraft owners must develop and include operational contingency procedures in the MEL in case of an equipment malfunction.

b) Where non-safety related equipment is part of another aircraft system, for example the electrical system, procedures must be developed and included in the MEL for deactivating and securing in case of malfunction.

In these cases, the item must be listed in the MEL, with compensating provisions and deactivation instructions if applicable. The rectification interval will be dependent on the secondary function of the item and the extent of its effect on other systems.

5.2.2.8 Removal of Equipment

Except as permitted by the IOMAR in accordance with the ANO, operation of an aircraft with aircraft equipment removed is prohibited, unless an aircraft operator does so in compliance with an approved MEL.
Certain MMELs allow Non-Safety Related Equipment items (see 5.2.2.7) to be removed if inoperative. An Operator may include this privilege in their MEL only if permitted by the MMEL.

5.2.2.9 **Deferral of Items**

Procedures for the deferral and management of MEL items should be included in the aircraft operators’ Technical Log, Journey log or equivalent document. The aircraft operator should ensure these procedures are referenced in the MEL.

5.2.2.9.1 Requirements

These procedures comprise a method for:

a) Recording deferral, transfer and/or rectification of inoperative equipment;

b) Placarding requirements as per the MEL;

c) Dispatching of an aircraft with deferred MEL item(s);

d) Using a remote deferral system (if applicable);

e) Controlling categorised times; and

f) Training of personnel who are responsible for MEL compliance procedures.

5.2.2.9.2 Review of Deferred Items

The operator of an aircraft registered in the Isle of Man should ensure that any deferred items are periodically reviewed to ensure that any accumulation of deferred defects neither conflict with each other nor create an unacceptable increase in pilot workload. Notwithstanding the categorisation of item rectification intervals, it should be the aim of aircraft operators to ensure that inoperative items are repaired as quickly as possible. It is the policy of the IOMAR that optional inoperative equipment should be rectified or removed i.a.w. an approved de-modification process from an aircraft.

5.2.2.10 **Placarding**

Inoperative items should be placarded to inform crewmembers of equipment condition as appropriate. When they are accessible to the crew in flight, the control(s), and/or indicator(s) related to inoperative unit(s) or component(s) should be clearly placarded.

Though the MEL for some items may require specific wording, the majority of items leave the placard wording and location to be determined by the aircraft operator.

The aircraft operator shall provide the capability and instructions to the pilot in command to ensure that the placard is in place prior to the aircraft being dispatched.

*Note* Some MMEL’s indicate the need for a placard through the use of an asterisk. However, the exclusion of an asterisk in a MMEL does not preclude the requirement for placarding.

5.2.2.10.1 Requirements to Placard/Placard Control

Placarding should be carried out in accordance with the placarding procedures established and set out in the aircraft operator’s Technical Log, Journey log or equivalent document. The method of placarding should ensure that all inoperative items are placarded and that placards are removed and accounted for when the defect is cleared.
Chapter 5.2 – **Minimum Equipment List**

The defective equipment/system shall be placarded so as to inform the pilot in command of the inoperative condition(s) of the item. To the extent practicable, placards must be located as indicated in the MEL, or adjacent to the control or indicator affected.

5.2.2.10.2 Placard Criteria

Where possible placards should be self-adhesive and contain sufficient information about the defect such that the pilot in command clearly understands the effect of the defect on the aircraft's continued safe operation.

5.2.2.10.3 Multiple Placards

If more than one placard is required for an MEL item, aircraft operators should ensure that all placards are removed when the defect is cleared.

5.2.2.10.4 Temporary Placards

The pilot in command may install a temporary placard as required by the MEL thereby enabling the aircraft to continue to a location where the defect may be rectified or be re-deferred in accordance with the deferral system.

5.2.2.11 Dispatch

"Dispatch" for the purpose of the MEL/MMEL refers to the commencement of flight, which is defined as “the point when an aircraft begins to move under its own power for the purpose of preparing for take-off.” The MEL is approved on the basis that equipment will be operative for flight unless the appropriate MEL procedures have been carried out.

The MEL should include procedures to deal with any failures which occur between the start of taxi or push back and take-off brake release. Any failure which occurs after the commencement of flight should be dealt with as an in-flight failure, by reference to the appropriate section of the Aircraft Flight Manual or Operating Manual, as necessary.

5.2.2.11.1 Operational and Maintenance Items

a) Any item of equipment in the MEL which, when inoperative, would require an operational or maintenance procedure to ensure an acceptable level of safety should be so identified in the "remarks" or "exceptions" column of the MEL. This will normally be 
"(O)" for an operational procedure, or "(M)" for a maintenance procedure. (O)(M) means both operational and maintenance procedures are required.

b) (O) Items

1. Aircraft with inoperative equipment requiring an operational procedure may continue in service following completion of the required MEL procedure for deferral.

2. Operational procedures are normally carried out by the operating crew but may be accomplished by other competent personnel.

c) (M) Items

1. Aircraft with inoperative equipment requiring a maintenance procedure may continue in service following completion of the required MEL procedure for deferral.

2. Maintenance procedures are normally accomplished by maintenance personnel, but some elementary maintenance tasks may be carried out by personnel authorised by the IOMAR, for example flight crew members.
5.2.2.12 Training

5.2.2.12.1 Familiarisation Programme — Ground Personnel

Aircraft operators must ensure that when utilising the services of ground personnel, they are familiarised with the MEL when appropriate including placarding inoperative equipment, deferral procedures, aircraft dispatch and any MEL related procedures.

5.2.2.12.2 Familiarisation Programme — Pilot in Command

Aircraft operators must ensure that the pilot in command is familiar in the use of the MEL with particular regard to pilot in command responsibilities.

5.2.3 MEL Amendments

All amendments to a MEL must be approved by the IOMAR.

The MEL must remain compliant with the MMEL and Manufacturers O&M Procedures it is based on, therefore revisions to the source MMEL(s) and/or Manufacturers O&M Procedures must be reviewed in a timely manner and resulting amendments to the MEL submitted to the IOMAR for approval within 90 days from the amendment effective date.

Voluntary amendment of the MEL may be carried out as required by the operator and submitted for approval – provided the proposed change(s) are no less restrictive than the source MMEL.

Amended MELs must be submitted to the Registry as per the Initial MEL Approval process (refer to 5.2.1.4 MEL Approval Application) together with a list of, and justification for the changes included on Form 8.

Once the amendment has been approved, the IOMAR will inform the Flight Operations Representative (and Operator) that the approved MEL can be used operationally.
Appendix 1 MEL Preamble

Appendix 1

MEL Preamble

(OPERATOR’S NAME)

MINIMUM EQUIPMENT LIST

(AIRCRAFT TYPE)

PREAMBLE

Note  This Preamble meets the IOMAR Standards.
Text in blue font is for guidance, and should not appear in the submitted MEL
Text in red font requires the operator to enter the indicated information

1 Introduction

The Minimum Equipment List (MEL) is based on the (Certificating Authority) Master Minimum Equipment List (MMEL) (Aircraft Type) (Revision, dated), and the (Aircraft Type) Operation & Maintenance (O&M) Procedures Manual (Revision, dated)

This MEL takes into consideration (the operator’s) particular aircraft equipment, configuration and operational conditions, routes being flown and requirements set by the IOMAR.

This MEL will not deviate from any applicable Airworthiness Directive or any other Mandatory Requirement and will be no less restrictive than the MMEL.

The MEL is intended to permit operations with inoperative items of equipment for a period of time until rectification can be accomplished.

Rectification is to be accomplished at the earliest opportunity.

MEL Conditions and Limitations do not relieve the Pilot in Command from determining that the aircraft is in a fit condition for safe operation with specified unserviceabilities allowed by the MEL.

The provisions of the MEL are applicable until the aircraft commences the flight.

Any decision to continue a flight following a failure or unserviceability which becomes apparent after the commencement of a flight must be the subject of pilot judgement and good airmanship. The Pilot in Command may continue to make reference to and use of the MEL as appropriate.

By approving the MEL, the IOMAR permits dispatch of the aircraft for flight with certain items or components inoperative provided an acceptable level of safety is maintained by use of appropriate operational or maintenance procedures, by transfer of the function to another operating component, or by reference to other instruments or components providing the required information.
Chapter 5.2 – Minimum Equipment List

2 Contents of MEL

The MEL contains only those items required by operating regulations or those items of airworthiness significance which may be inoperative prior to dispatch, provided that appropriate limitations and procedures are observed. Equipment obviously basic to aircraft airworthiness such as wings, rudders, flaps, engines, landing gear, etc. are not listed and must be operative for all flights.

It is important to note that:

ALL ITEMS WHICH ARE RELATED TO THE AIRWORTHINESS OF THE AIRCRAFT AND ARE NOT INCLUDED ON THE LIST ARE AUTOMATICALLY REQUIRED TO BE OPERATIVE.

3 Criteria for Dispatch

The decision of the Pilot in Command of the flight to have allowable inoperative items corrected prior to flight will take precedence over the provisions contained in the MEL. The Pilot in Command may request requirements above the minimum listed whenever, in his judgement, such added equipment is essential to the safety of a particular flight under the special conditions prevailing at the time.

The MEL cannot take into account all multiple unserviceabilities. Therefore, before dispatching an aircraft with multiple MEL items inoperative, it must be assured that any interface or inter-relationship between inoperative items will not result in degradation in the level of safety and/or an undue increase in crew workload. It is particularly in this area of multiple discrepancies and especially discrepancies in related systems that good judgement – based on the circumstances of the case, including climatic and en-route conditions – must be used.

4 Maintenance Action

Every effort shall be made by Maintenance to correct all technical defects as early as practicable and that the aircraft is released from a maintenance station in fully operational condition. The Pilot in Command must be informed by Maintenance as soon as practicable, should it be impossible to rectify the inoperative item prior to departure.

Whenever an aircraft is released by Maintenance for dispatch with items inoperative, the following is required:

a) The log book, or equivalent, aboard the aircraft must contain a detailed description of the inoperative item(s), special advice to the flight crew, if necessary, and information about corrective action taken.

b) When they are accessible to the crew in flight, the control(s), and/or indicator(s) related to inoperative unit(s) or component(s) must be clearly placarded.

c) If inadvertent operation could produce a hazard, such equipment must be rendered inoperative (physically) as given in the appropriate maintenance procedure.

d) The relevant operational and maintenance procedures are contained in (identify the particular Manual, Section, Chapter or Part etc.).
5 Rectification Intervals

Inoperative items or components, deferred in accordance with the MEL, must be rectified at or prior to the Rectification Intervals established by the following letter designators given in the ‘Rectification Interval Category’ column of the MEL.

Category A

Items in this category shall be rectified within the limitations specified in the MEL entry, commencing at 00:01 on the day following discovery for those items specified in calendar days.

Category B

Items in this category shall be rectified within three (3) consecutive calendar days, excluding the day of discovery.

Category C

Items in this category shall be rectified within ten (10) consecutive calendar days, excluding the day of discovery.

Category D

Items in this category shall be rectified within one hundred and twenty (120) consecutive calendar days, excluding the day of discovery.

6 Definitions

For the purpose of this MEL the following definitions shall apply:

‘Airplane Flight Manual (AFM) / Rotorcraft Flight Manual (RFM)’ is the document required for type certification and approved by (insert aircraft State of TCDS). The approved AFM/RFM (delete as applicable) for the specific aircraft is listed on the applicable Type Certification Data Sheet.

‘As required by Air Navigation Legislation / Operating Requirements’ the associated item must comply with legal provisions such as the Air Navigation (Isle of Man) Order or any other legislation in force during the flight.

‘Authority’ the competent regulatory authority according to the country of registry; for an aircraft registered in the Isle of Man it is the Isle of Man Aircraft Registry.

‘Calendar Day’ means a 24-hour period from midnight to midnight based on either UTC or local time, as selected by the operator. All calendar days are considered to run consecutively.

‘Combustible Material’ is material which is capable of catching fire and burning.

‘Commencement of flight / Dispatch’ is the point when an aircraft begins to move under its own power for the purpose of preparing for take-off.

‘Considered Inoperative’ as used in the dispatch conditions, means that item must be treated for dispatch, taxiing and flight purposes as though it were inoperative. The item shall not be used or operated until the original deferred item is repaired. Additional actions include: documenting the item on the dispatch release (if applicable), placarding, and complying with all remarks, exceptions, and related MEL provisions, including any (M) and (O) procedures and observing the rectification interval.

‘Day of Discovery’ is the calendar-day an equipment/instrument malfunction was discovered.

‘Day operation’ is any flight conducted from the point of take-off to landing between 30 minutes before sunrise and 30 minutes after sunset being determined at surface level, both times exclusive.
Chapter 5.2 – Minimum Equipment List

‘Flight’ the period of time between the moment when an aircraft begins to move under its own power, for the purpose of preparing for take-off, until the moment the aircraft comes to a complete stop on its parking area, after the first landing.

‘Flight Day’ means a 24-hour period (from midnight to midnight) either Universal Coordinated Time (UCT) or local time, as established by the operator, during which at least one flight is initiated for the affected aircraft.

‘Icing Condition’ the atmospheric environment is such that ice can form on the aircraft or engine(s).

‘Inoperative’ means that the equipment does not accomplish its intended purpose or is not consistently functioning within its design operating limits or tolerances. Some systems have been designed to be fault tolerant and are monitored by digital computers which transmit fault messages to a centralised computer for the purpose of maintenance. The presence of this category of message does not mean that the system is inoperative.

‘Visual Meteorological Conditions’ (VMC) means weather permitting flight in accordance with the Visual Flight Rules, as defined in the Rules of the Air Regulations.

Note This is not an exhaustive list and operators should include in their MELs all definitions from the MMEL which are considered to be relevant.

7 Centralised Message Systems (if appropriate)

The aircraft is equipped with a system (such as ECAM/EICAS) which provides different levels of systems information messages (Warning, Caution, Advisory, Status, Maintenance etc.). Any aircraft discrepancy message that affects dispatch will normally be at status message level or higher. Therefore, system conditions that result only in a Maintenance Message are not normally addressed in the MEL as they, in themselves, do not prohibit dispatch of the aircraft. However, maintenance discrepancy messages must be recorded and corrected in accordance with the approved maintenance programme.

8 Operations outside the Scope of the MEL

In exceptional circumstances, the IOMAR may issue a Permission to [operator’s name] to dispatch with an inoperative item of equipment on a case by case basis, provided such Permission complies with the applicable limitations in the MMEL.

Flights for the purpose of returning the aircraft to a place where it can be repaired may be dispatched with less than the equipment specified in the MEL, provided all the equipment expected to be utilised in flight is operable and any relevant Sections of the Flight Manual are applied. The Permit to Fly must be granted by the IOMAR before the flight takes place and also permission from all states which are to be overflown and the state in which the aircraft lands will be required prior to flight.

9 Minimum Equipment Required for Operational Approvals

(Operator to insert operational approvals granted by the IOMAR and the minimum equipment required for each approval, or where the minimum equipment requirement can be located, e.g. AFM)
Operators affected by EASA Part-NCC who operate a non-EASA Type Certificated aircraft, are required by European legislation to comply with EASA Air Ops.

In addition to the approval of the MEL by the IOMAR, the EASA competent authority which has oversight of the operator under the EASA Air Ops legislation are also required to approve an operators MEL. The competent authority must review the MEL and amendments against the EASA OSD MMEL.

For non-EASA type certificated aircraft, the MEL must be no less restrictive than both the MMEL acceptable to the IOMAR and the EASA OSD MMEL. The Preamble Introduction should be amended as per the suggestion below.

1 Introduction

The Minimum Equipment List (MEL) is based on the (Certificating Authority) Master Minimum Equipment List (MMEL) (Aircraft Type) (Revision, dated), and the (Aircraft Type) Operation & Maintenance (O&M) Procedures Manual (Revision, dated).

Owing to operations conducted under EASA Part-NCC, and requirement for Competent Authority (Applicable CAA) approval, the MEL has also been reviewed against EASA Operational Suitability Data (OSD) Master Minimum Equipment List (MMEL), (Aircraft Type) (Revision, dated).

This MEL takes into consideration (the operator's) particular aircraft equipment, configuration and operational conditions, routes being flown and requirements set by the IOMAR.

This MEL will not deviate from any applicable Airworthiness Directive or any other Mandatory Requirement and will be no less restrictive than both the (Certificating Authority) MMEL and EASA OSD MMEL.

The MEL is intended to permit operations with inoperative items of equipment for a period of time until rectification can be accomplished.

Rectification is to be accomplished at the earliest opportunity.

MEL Conditions and Limitations do not relieve the Pilot in Command from determining that the aircraft is in a fit condition for safe operation with specified unserviceabilities allowed by the MEL.

The provisions of the MEL are applicable until the aircraft commences the flight.

Any decision to continue a flight following a failure or unserviceability which becomes apparent after the commencement of a flight must be the subject of pilot judgement and good airmanship. The Pilot in Command may continue to make reference to and use of the MEL as appropriate.

By approving the MEL, the IOMAR permits dispatch of the aircraft for flight with certain items or components inoperative provided an acceptable level of safety is maintained by use of appropriate operational or maintenance procedures, by transfer of the function to another operating component, or by reference to other instruments or components providing the required information.

Continue using the remainder of the Preamble from Appendix 1.
5.3 Electronic Flight Bag (EFB)

Information and data for flight crews to use on the flight deck has traditionally been in paper format but now much, if not all, of this information is available electronically. The Electronic Flight Bag (EFB) is an electronic storage, retrieval and display system designed to replace traditional paper products in the cockpit. EFB devices can also store and display a variety of aviation data or perform calculations such as performance and mass and balance considerations. The scope of the EFB system functionality may also include various other hosted databases and applications. Physical EFB displays may use various technologies, screen sizes, formats and forms of communication.

The use of an EFB introduces a wide variety of hazards and risk that must be carefully managed.

Contrary to common perception, the application process for use of installed EFB’s on M-Registered aircraft is considerably simpler than most applicants initially thought, requiring less supporting documentation that portable EFB’s. The IOMAR fully encourage the use of flight crews taking advantage of the full functionality of installed EFB’s where possible.

The Isle of Man Aircraft Registry categorises an EFB system as either ‘portable’ or ‘installed’ (replacing the previous Class 1, 2, and 3). Portable or Installed EFBs harmonise with the ICAO (and FAA & EASA) terminology and helps to accommodate increasingly complex systems integrating both installed and portable equipment. These new system classifications will help to assist the scoping of the Operational Risk Assessment (see 5.3.5.1). EFBs can be either portable or installed (i.e., part of the aircraft definition).

5.3.1 EFB Definitions

‘Electronic Flight Bag’ (EFB) is an electronic information system, comprised of equipment and applications for flight crew, which allows for storing, updating, displaying and processing of EFB functions to support flight operations or duties.

‘Portable EFB’ is not part of the aircraft configuration and are considered to be PEDs. They generally have self-contained power and may rely on data connectivity to achieve full functionality. Modifications to the aircraft to use portable EFBs require the appropriate airworthiness approval depending on the State’s regulatory framework.

‘Installed EFB’ is integrated into the aircraft, subject to normal airworthiness requirements and under design control. The approval of these EFBs is included in the aircraft’s type certificate (TC) or in a supplemental type certificate (STC).

‘Critical phases of flight’ in the case of helicopters means taxiing, hovering, take-off, final approach, missed approach, the landing and any other phases of flight as determined by the pilot-in-command or commander.’

‘Critical phases of flight’ in the case of aeroplanes means the take-off run, the take-off flight path, the final approach, the missed approach, the landing, including the landing roll, and any other phases of flight as determined by the pilot-in-command or commander.’

‘Portable Electronic Device’ (PED) is any kind of electronic device, typically but not limited to consumer electronics, brought on board the aircraft by crew members, passengers, or as part of the cargo and that are not included in the approved aircraft configuration. All equipment that is able to consume electrical energy falls under this definition. The electrical energy can be provided from internal sources as batteries (chargeable or non-rechargeable) or the devices may also be connected to specific aircraft power sources.

Note: A PED becomes an EFB when:
- it is used to display operational information during the flight;
Chapter 5.3 – Electronic Flight Bag

- it is used to calculate operational information relating to the flight, i.e. performance and/or mass & balance;
  
  Or

- as a back-up for an installed or portable EFB or paper charts.

5.3.2 Regulatory Requirements

The Isle of Man Aircraft Registry as the State of Registry is required by ICAO Annex 6 Part II & Part III, Section III to “establish criteria for the operational use of EFB functions to be used for the safe operation of aeroplanes/helicopters” and ensure that:

a) The EFB equipment and its associated installation hardware, including interaction with aeroplane/helicopter systems (if applicable) meet the appropriate airworthiness certification requirements.

b) The operator/owner has assessed and mitigated as far as possible the risks associated with the operations supported by the EFB functions

c) The operator/owner has established requirements for redundancy of the information contained in and displayed by the EFB functions.

d) The operator/owner has established and documented procedures for the management of the EFB functions including any databases it may use.

e) The operator/owner has established and documented the procedures for the use of, and training requirements for, the EFB functions.

Note: aircraft operators shall ensure that portable EFBs do not affect the performance of the aeroplane/helicopter systems, equipment or the ability to operate the aeroplane/helicopter.

5.3.2.1 Operator Responsibility

For portable and installed EFBs the aircraft operator shall:

a) assess the safety risk(s) associated with each EFB function (see Operational Risk Assessment at 5.3.5.1);

b) establish the procedures for the use of, and training requirements for, the device and each EFB function; and

c) ensure that, in the event of an EFB failure, sufficient information is readily available to the flight crew for the flight to be conducted safely.

5.3.2.2 Regulatory Standards

The Isle of Man Aircraft Registry recognises that different regulatory standards prevail and that strict alignment with one of the main regulatory regimes may present obstacles that do not enhance safety. Therefore, the use of appropriate supplementary guidance from ICAO, EASA or other aviation sources may be used as an aid to meeting these standards. This may include:


b) FAA Advisory Circular No.120-76(): Authorization for Use of Electronic Flight Bags.


d) Transport Canada Advisory Circular AC 700-020: Electronic Flight Bags.
5.3.3 Requirement for Non-Approved EFB Onboard Aircraft

Any EFBs onboard an aircraft that are not approved for operational use by the IOMAR must be suitably placarded to state ‘EFB is not approved for Operational Use’ or similar wording.

In addition:

- The EFB should be in working order and not defective
- The EFB does not have to contain up to date data or software
- All instructions for continuing airworthiness for the EFB system are to be carried out as part of the maintenance programme.
- All crew are to be made aware that the EFB is not for operational use.

5.3.4 Operational Approval Application Process

An application for the approval of an EFB system should be submitted for each registered aircraft by the Operator/Flight Operations Representative (FOR) on Form 91 “Application for Approval to use an EFB System” which includes the minimum Operational Risk Assessment (ORA) requirement acceptable to the Registry. The ORA should be completed after the EFB system has been assessed by the EFB Administrator against the standards and guidance in this document.

5.3.4.1 Changes to or Addition to Existing EFB

Where an operator requires to add to an existing installed or portable EFB system, approval is required from the Isle of Man Aircraft Registry as per an initial application. Approval is not required for any routine changes to a current EFB system(s); however, the Operator should update the Operational Risk Assessment (see 5.3.5.1) and document the results in accordance with their own Safety Management System requirements (see 5.3.6.2). It should be noted that operating system and database updates are not considered to be changes but instead should be managed, controlled and tested as part of the ongoing EFB operation.

5.3.5 Operator Assessment

5.3.5.1 Operational Risk Assessment

The Operator shall undertake an Operational Risk Assessment (ORA) which must be submitted to the Registry as part of the application process. The ORA should demonstrate that all the hazards arising from the use of an EFB system have been identified, and that the associated risks have been assessed and mitigated as far as possible.

The ORA should be conducted in accordance with the Operators Safety Management System procedures for risk assessment and mitigation. If an operator already holds an existing EFB approval of the same EFB system classification (installed and/or portable) for other aircraft, of the same type, the ORA may take into account existing measures and processes where appropriate and subject to the proposed EFB having equivalent EFB technical and operational characteristics.

The scope of the ORA will for the most part depend on whether it is installed or portable. Particular attention should be paid to those functions that are safety critical and have caused accidents in the past, such as performance calculations and mass and balance calculations. This shall include ensuring that there are explicit procedures for the flight crew management of last minute changes such as revised runway entry points and consequent reduced take off run available.

Guidance on generic hazards, risks, and possible mitigation measures for installed and portable EFBs is at 5.3.8 - Appendix A. The ORA is also embedded within Form 91 to
ensure the ORA submitted as part of the application meets the minimum standards acceptable to the Registry.

Additional guidance is provided on the Aircraft Registry website www.iomaircraftregistry.com concerning lithium battery fires and rapid decompression testing for portable hardware devices.

5.3.5.2 Human Machine Interface Assessment

For portable EFB systems, an assessment of the human/machine interface (HMI) aspects of the EFB device(s) should be carried out, documented and retained by the operator. The assessment should include workload, usability, integration into the flight deck, display and lighting issues. Evidence of an HMI assessment from the EFB manufacturer should be sought in the first instance.

Further guidance on the contents of a HMI assessment is at 5.3.8 - Appendix B.

5.3.6 Operational Management

5.3.6.1 EFB Administrator

The role of the EFB Administrator is a key factor in the effective management of an operator’s EFB system. Complex EFB systems may require more than one individual to conduct the administration process, but one person should be designated as the EFB Administrator responsible for the complete system with appropriate authority within the operator’s management system.

Initial and recurrent training must be provided to the EFB Administrator to ensure that they are capable to undertake the responsibilities.

The operator should make arrangements to ensure the continuity of the management of the EFB system in the absence of the EFB Administrator.

The EFB Administrator responsibilities include ensuring:

a) the Operational Risk Assessment and HMI Assessment are completed accurately and completely, and are updated as necessary;

b) any hardware conforms to the required specification;

c) the hardware, software and data packages conform to the required specification and are the correct versions;

d) that no unauthorised software is installed;

e) only the current versions of application software and data packages are installed;

f) all staff who may be involved with the system are aware of their roles and responsibilities, and the hazards that are associated with the use of an EFB;

g) security knowledge of EFB systems is up to date and that potential security issues associated with the application installed have been checked;

h) EFB users are appropriately supported on the use of the applications;

i) an appropriate level of testing on new/updated EFB software and operating system is conducted;

j) appropriate safeguards are provided to protect the integrity of electronically held documentation and data from unauthorised changes;
k) oversight of sub-contracted services associated with the EFB system; and

l) coordination of the flow of information within the Operator’s departments required to maintain an effective EFB system, e.g. where applicable the MEL will require amendment when an EFB system is introduced or modified, and the Flight Operations Representative should ensure that this takes place.

(NOTE: In accordance with RP4 Chapter 5.2, amended MELs should be submitted to the Registry using a Form 8A – MEL Amendment Compliance Statement along with the required supporting documentation.)

The EFB Administrator will interface with the operator’s Compliance Monitoring and/or Safety Management Systems, and ensure that appropriate action is taken when required by these systems.

5.3.6.2 Quality/Compliance Monitoring and Safety Management Systems

The Operator’s Quality/Compliance Monitoring System and Safety Management System should incorporate the EFB into the respective audit schedules and processes. The systems should provide for incident and fault reporting associated with the EFB system.

5.3.6.3 Incorporation of ADs and/or STCs into an EFB

Airworthiness Directives (ADs), Supplementary Type Certificates (STCs) or other documents may require a page(s) to be inserted into an AFM/RFM or a page amended by hand.

Where the AFM/RFM is held on an EFB, this can be difficult or impossible to achieve. The IOMAR recognise the difficulties of achieving full compliance with the requirement of the AD/STC, where such a supplement requirement exists.

Therefore an IOMAR approved AMOC for AD supplement that require an AFM page insertion or page amendment will be:

- A copy of the applicable page identified in the AD to be kept on-board the aircraft in hard copy; or

- A copy of the applicable page identified in the AD may be available on the EFB or other digital equipment.

In both cases, the operator must implement a robust process to ensure that all flight crew are made aware of the AD or STC information and where it is stored.

Operators may choose to keep both a hard copy of the AFM/RFM and an electronic copy on the EFB, however both copies must be at the same/latest revision status.

5.3.7 Training

5.3.7.1 General

All personnel who have a role in the EFB system should be trained initially and on a recurrent basis. All training requirements should be described in appropriate manuals, and training records completed and retained for at least the period of employment plus 1 year.

5.3.7.2 EFB Administrator Training

Initial and recurrent training must be provided to the EFB Administrator to ensure that they are capable to undertake the responsibilities.

5.3.7.3 Flight Crew Training

Initial and recurrent Ground Training should include at least the following:
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a) an overview of the system architecture;

b) pre-flight checks of the system;

c) limitations of the system;

d) specific training on the use of each application and the conditions under which the EFB may and may not be used;

e) restrictions on the use of the system, including where some or all of the system is not available;

f) procedures for normal operations;

g) procedures to handle abnormal situations, such as a late runway change or diversion to an alternate aerodrome;

h) procedures to handle emergency situations;

i) procedures for cross-checking of data entry and computed information;

j) phases of flight when the EFB system may and may not be used;

k) CRM and human factor considerations on the use of the EFB; and

l) additional training for new applications, or changes to the hardware configuration.

5.3.7.4 Simulator or Aircraft Training:

a) Initial and recurrent simulator or aircraft training should incorporate use of the EFB. As far as practicable, it is recommended that the training simulator environment includes the EFBs in order to offer a higher level of representativeness.

b) Consideration should also be given to the role that the EFB system plays in operator proficiency checks as part of recurrent training and checking, and to the suitability of the training devices used during training and checking.

c) As new aircraft types are introduced, simulator operators may be unable to equip training devices with fully-functional EFB systems, which reflect the hardware and/or software status of the Operator’s aircraft. Operators should liaise with simulator operators at the earliest opportunity and determine how to provide adequate EFB training. Where no flight simulator is available to reflect the EFB equipage, suitable methods should be established for initial and recurrent EFB training.

d) Small Operators may lack sufficient expertise or resources to adequately support the management of EFB software and data. Where such functions are outsourced, the Operator should be aware of the need to monitor the accuracy of the sub-contractor’s services.

e) Small Operators may introduce EFB-equipped aircraft for which no flight simulator is available. Suitable methods should be established for initial and recurrent EFB training.
5.3.8 EFB Appendices

Appendix A - Guidance on Conducting an EFB Operational Risk Assessment

The objective of the Operational Risk Assessment is to demonstrate that the EFB achieves at least the same level of integrity and availability as the “traditional” means that it is intended to replace and risks are appropriately mitigated and controlled. This analysis may make use of assessments previously carried out by the manufacturer or EFB supplier, which should be reviewed, validated and built upon to ensure that it is appropriately reflects the operator’s particular scope and type of use and the requirements of this publication.

The following is intended to act as a guide to operators in developing their EFB Operational Risk Assessment. It is recommended that operators consider each issue as relevant depending on the EFB system classification, consider the risk posed and identify appropriate measures to mitigate the risk.

Where a mitigation listed below is used, this should not be just copied and pasted into the Operational Risk Assessment but should be evidenced e.g. by providing appropriate references to documents or recording specific actions completed.

<table>
<thead>
<tr>
<th>Category</th>
<th>Risk</th>
<th>Possible Mitigations</th>
<th>Portable</th>
<th>Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power and batteries</td>
<td>Lithium battery leakage and/or overheat, or fire</td>
<td>Ensure replacement batteries and chargers are approved by manufacturer of EFB</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedures for storage of spares that prevents the potential for short circuit</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedures and limitations for recharging of batteries so as to prevent battery overheating or overcharging.</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appropriate lithium battery firefighting procedures and equipment.</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Battery discharge – loss of power</td>
<td>Backup procedures for battery loss of power</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Aircraft Interface</td>
<td>EFB places undue power load on aircraft system</td>
<td>Limitations for use of certified power sources</td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

Only when connected into the aircraft for power
<table>
<thead>
<tr>
<th>Category</th>
<th>Risk</th>
<th>Possible Mitigations</th>
<th>Portable</th>
<th>Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware</td>
<td>EFB causes physical and/or visual obstruction to other instruments/controls and, or external vision</td>
<td>Assessment of placement for operational use and emergency evacuation</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>EFB stowage area with securing mechanism that avoids interference with flight controls and instruments and is readily accessible in flight</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedures for unsecured EFB stowage to prevent the device jamming flight controls, damaging flight deck, or injuring crew in the event of turbulence etc.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cabling secured and of appropriate length so as to not cause a safety hazard but to enable safe use.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Effect of rapid depressurisation on EFB within pressurised aircraft</td>
<td>Reference to testing completed by the COTS supplier for aviation use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rapid decompression testing (type B software only) in accordance with accepted procedures e.g. EUROCAE ED-14D/RTCA DO-160</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For an EFB that has failed rapid decompression testing while turned on but successfully completed it when off, procedures in place to ensure that at least one EFB on board the aircraft remains off during the applicable flight phases, or alternative paper back up available.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete or partial failure of a single EFB</td>
<td>Back up procedures and data (paper, alternative EFB from a different power source etc.)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Operations</td>
<td>Software updates</td>
<td>Test software on clean device before live operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Backup procedures and data</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Virus protection procedures and tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Database updates</td>
<td>Procedures for monitoring database expiry</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Risk</td>
<td>Possible Mitigations</td>
<td>Portable</td>
<td>Installed</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>----------------------</td>
<td>----------</td>
<td>-----------</td>
</tr>
</tbody>
</table>
| Operations (Cont.) | Erroneous input/output | Cross check procedures  
Procedures that define any roles that the flight crew and others involved in performance calculations may have in creating, reviewing, cross checking, communicating and using performance calculations supported by EFB systems.  
Procedures that define any roles that the flight crew and others involved in the calculation of the mass and balance in creating, reviewing, cross checking, communicating and using mass and balance calculations supported by EFB systems.  
Procedures to ensure that the flight crew know which aircraft system (e.g. Engine Indicating and Crew Alerting System, Flight Management System or EFB system) to use for a given purpose, especially when both the aircraft and EFB systems provide similar information.  
Procedures to define the actions to be taken when information provided by an EFB system does not agree with that from other flight deck sources, or when one EFB system disagrees with another.  
If an EFB system generates information similar to that generated by existing flight deck automation, procedures should clearly identify which information source will be primary, which source will be used for back up information, and under what conditions to use the back-up source. | ✓ | ✓ |
<table>
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</tr>
</thead>
</table>
| Operations (Cont.) | Flight crew workload       | - The EFB software design should minimize flight crew workload and head-down time.  
- Procedures to mitigate and/or control any additional workload created by using an EFB system and to avoid both flight crew members becoming preoccupied with the EFB system at the same time.  
- Procedures for workload sharing between flight crew members to ensure ease of use and continued monitoring of other flight crew functions and aircraft equipment.  
- Procedures to specify when the EFB may not be used. Avoid complex, multi-step data entry tasks during takeoff, landing, and other critical phases of flight. | √        | √         |
|                  | EFB non availability (pre-flight) | - Impact of the EFB system on the Minimum Equipment List (MEL) determined.  
- Availability of the EFB to be confirmed by pre-flight checks.  
- Instructions to flight crew should clearly define actions to be taken in the event of any EFB system deficiency and whether dispatch is allowed. |          |           |
|                  | Abrasion and ageing         | - Protective screen covers  
- Routine inspections  
- Damage reporting procedures |          | √         |
|                  | Security                    | - Unauthorised intervention  
- Security procedures to protect the system at software level and to manage hardware. |          | √         |
HMI assessments should include a review of the complete system to include at least the points below (unless previously carried out by the manufacturer or EFB supplier).

**INTERFACES, COLOURS, SYMBOLOGY:**

- The EFB user interface should be consistent and intuitive within and across various EFB applications, including, but not limited to, data entry methods, colour-coding philosophies, terminology, and symbology.

**LEGIBILITY OF TEXT:**

- Information displayed on the EFB should be legible to the typical user at the intended viewing distance(s) and under the full range of lighting conditions expected on a flight deck, including use in direct sunlight.
- Users should be able to adjust the screen brightness of an EFB independently of the brightness of other displays on the flight deck. Brightness should be adjustable in fine increments. In addition, when incorporating an automatic brightness adjustment, it should operate independently for each EFB in the flight deck. Brightness adjustment using software should not adversely affect flight crew workload.
- Buttons and labels should have adequate illumination for night use.
- All controls must be properly labelled for their intended function.
- The EFB should not produce objectionable glare or reflections that could adversely affect the pilot’s visual environment.

**APPROACH/DEPARTURE AND NAVIGATION CHART DISPLAY:**

- Electronic aeronautical charts should provide a level of information comparable to paper charts. This requires appropriate screen size and resolution that is comparable to the readability of the paper information it is intending to replace.

**RESPONSIVENESS OF APPLICATION:**

- The system should provide feedback to the user when user input is accepted.
- If the system is busy with internal tasks that preclude immediate processing of user input (e.g. calculations, self-test, or data refresh), the EFB should display a “system busy” indicator (e.g. clock icon) to inform the user that the system is occupied and cannot process inputs immediately.
- The timeliness of system response to user input should be consistent with an application’s intended function. The feedback and system response times should be predictable to avoid flight crew distractions and/or uncertainty.

**OFF-SCREEN TEXT AND CONTENT:**

- If the document segment is not visible in its entirety in the available display area, such as during “zoom” or “pan” operations, the existence of off screen content should be clearly indicated in a consistent way. For some intended functions it may be unacceptable if certain portions of documents are not visible. The basis of this evaluation should be on the application and intended operational function.
- If there is a cursor, it should be visible on the screen at all times while in use. The default position should be easily accessible after any active manipulation (e.g. zooming, panning, or decluttering).
ACTIVE REGIONS:
- Active regions are regions to which special user commands apply. The active region can be text, a graphic image, a window, a frame, or another document object. If the display uses active regions, these regions should be clearly indicated.

MANAGING MULTIPLE OPEN APPLICATIONS AND DOCUMENTS:
- If the electronic document application supports multiple open documents, or the system allows multiple open applications, indication of which application and/or document is active should be continuously provided. The active document is the one that is currently displayed and responds to user actions.
- Under non-emergency, normal operations, the user should be able to select which of the open applications or documents is currently active. In addition, the user should be able to find which flight deck applications are running and switch to any one of these applications easily. When the user returns to an application that was running in the background, it should appear in the same state as when the user left that application—other than differences associated with the progress or completion of processing performed in the background.

MESSAGES
- EFB messages and reminders should be integrated with (or compatible with) presentation of other flight deck system alerts.
- EFB messages, both visual and auditory, should be inhibited during critical phases of flight. Flashing text or symbols should be avoided in any EFB application.
- Messages should be prioritised and the message prioritisation scheme evaluated and documented. Additionally, during critical phases of flight, required flight information should be continuously presented without un-commanded overlays, pop-ups, or pre-emptive messages, except those indicating the failure or degradation of the current EFB application.
- System error messages: If an application is fully or partially disabled, or is not visible or accessible to the user, it may be desirable to have a positive indication of its status available to the user upon request. Certain nonessential applications such as email connectivity and administrative reports may require an error message when the user actually attempts to access the function, rather than an immediate status annunciation when a failure occurs. EFB status and fault messages should be prioritised and the message prioritisation scheme evaluated and documented.

DATA ENTRY SCREENING AND ERROR MESSAGES
- If user-entered data is not of the correct format or type needed by the application, the EFB should not accept the data. An error message should be provided that communicates which entry is suspect and specifies what type of data is expected. The EFB system and application software should incorporate input error checking that detects input errors at the earliest possible point during entry, rather than on completion of a possibly lengthy invalid entry.
INPUT DEVICES:

- In choosing and designing input devices such as keyboards or cursor-control devices, operators should consider the type of entry to be made and flight deck environmental factors, such as turbulence and other normal vibrations that could affect the usability of that input device. Typically, the performance parameters of cursor-control devices are tailored for the intended application function as well as for the flight deck environment. Input devices should provide feedback to indicate when operational.

POSITION:

- If it has a stowed position the EFB should be easily accessible when stowed.
- When the EFB is in use and is intended to be viewed or controlled, it should be within 90 degrees on either side of each pilot’s line of sight.
- If an EFB is being used to display flight critical information such as for navigation, terrain and obstacle warnings that require immediate action, take-off and landing V-speeds, or for functions other than situational awareness, then such information needs to be in the pilot’s primary field of view. This requirement does not apply if the information is not being directly monitored from the EFB during flight. For example, an EFB may generate take-off and landing V-speeds, but these speeds are used to set speed bugs or are entered into the AFMS, and the airspeed indicator is the sole reference for the V-speeds. In this case, the EFB need not be located in the pilot’s primary field-of-view. A 90-degree viewing angle may be unacceptable for certain EFB applications if aspects of the display quality are degraded at large viewing angles (e.g. the display colours wash out or the displayed colour contrast is not discernible at the installation viewing angle).
- In addition, consideration should be given to the potential for confusion that could result from presentation of relative directions (e.g. positions of other aircraft on traffic displays) when the EFB is positioned in an orientation inconsistent with that information. For example, it may be misleading if own aircraft heading is pointed to the top of the display and the display is not aligned with the aircraft longitudinal axis.

REFLECTION:

- In the position in which it is intended to be used, the EFB should not produce objectionable glare or reflections that could adversely affect the pilot’s visual environment.
5.4 Steep Approach Approval

With the development of airports typically in congested city areas there is a need for aircraft to operate safely into such airports whilst avoiding obstacles by use of a steep approach. The lowest value of approach path angle to be considered for steep approach landing rules is 4.5°.

5.4.1 Application Process

Operators wishing to apply for a Steep Approach Approval to operate into a particular airport supported by the IOMAR must complete a Form 40 and indicate which steep approach airport they wish to apply for. The list of supported Steep Approach Approvals can be found in 5.4.2

5.4.2 Current Steep Approach Equipped Airports Supported by the IOMAR

5.4.2.1 London City Airport (EGLC)

London City Airport (EGLC) is an airport in the docklands of London City very close to the financial district.

London City Airport has a 5.5° steep approach equipped runway.

5.4.2.1.1 EGLC Specific Approval Requirements

In order to apply for EGLC Steep Approach Approval, a Form 40 should be submitted to the IOMAR together with a copy of the AFM Steep Approach evidence and proof of current steep approach flight crew training (within the last 12 months).

5.4.2.1.2 EGLC Training Requirements

Acceptable steep approaches are those that are 5.5 degrees or steeper, and are continuous in descent from the Final Approach Fix (FAF) or start of descent, down to precision approach Decision Height (DH) or non-precision approach Minimum Descent Height (MDH).

Airfields that have facilities for steep approach training include:
- Gloucestershire United Kingdom EGBJ +44 (0)1452 857 700
- Sion Switzerland LSGS +41 27 322 2480
- Brive/La Roche France LFBV +33 555 868 850
- Chambery France LFLB +33 479 544 613
- Innsbruck Austria LOWI +43 512 22525

Training can also be conducted in a simulator which is approved for steep approach training into London City by the relevant regulatory authority.

It is the operator’s responsibility to confirm the approach is 5.5 degrees or steeper before training at any airport.

**Caution:** Steep approaches such as Lugano (LSZA), Switzerland, are not considered acceptable for approval training or experience of steep approach conditions.

EGLC Airport Authority mandate that recurrent training is to be completed every 12 months. Copies of the training should be sent to the Jet Centre Coordinator at the address below.

5.4.2.1.3 EGLC Operational Requirements

All flights into London City must be dual pilot operations.
Chapter 5.4 – Steep Approach

London City is PPR and all operation enquiries should be made through the FBO, London City Jet Centre.

For further information please contact:
The Jet Centre Coordinator
London City Airport Jet Centre
Royal Docks
London, E16 2PL

IDD: +44 (0)207 646 0400
Fax: +44 (0)207 646 0450
Email: jetcentre@lcy.co.uk
SITA: LCYGAXH
AFTN: EGLCZPZX

5.4.2.1.4 1st Flight into EGLC

After receiving both the Landing Certification Approval from London City and receiving the updated Operations Specification from the IOMAR:
• Contact the Jet Centre at London City via fax, email or SITA with your handling request;
• The initial flight into London City must be within Visual Meteorological Conditions (VMC) with visibility not less than 10K, cloud base not less than 3000ft (other than scattered).

5.4.2.2 Lugano Airport (LSZA)

Lugano international airport is only 6 km away from the centre of Lugano, the 3rd most important financial centre in Switzerland, and on the border with Italy, allowing easy and fast connections to Milan.

Lugano Airport has 2 ILS steep approaches to Runway 01 with a circling to land on Rwy 19.

5.4° steep approach equipped runway requiring Type B qualified flight crew.

6.65° steep approach equipped runway requiring Type C qualified flight crew.

5.4.2.2.1 LSZA Specific Approval Requirements

In order to apply for LSZA Steep Approach Approval, a Form 40 should be submitted to the IOMAR together with:
• A copy of the AFM Steep Approach evidence (or Letter of Non-Objection from the aircraft manufacturer);
• Proof Type B or Type C training (as applicable) flight crew training (within the last 12 months; and
• Copy of contingency procedures (acc. PANS OPS).

5.4.2.2.2 LSZA Training Requirements

Lugano Airport Authority has produced Training Requirements Application Manual (TRAM) which can be accessed via http://www.lugano-qualification.ch/home.php.

The TRAM contains the training requirements for both Type B and Type C pilot qualifications.
Chapter 6: All Weather Operations (AWOPS)

Before conducting All Weather Operations (AWOPS), Operators of M-registered aircraft must obtain an AWOPS approval from the Isle of Man Aircraft Registry (IOMAR).

6.1 Application Process

Operators wishing to apply for an AWOPS Approval should read RP 39 and complete Form 39.

Operators who do not wish to apply for CAT II or CAT IIIA/B can apply for an exemption to use an EVS/HUD to descend below Minima, please read RP 44 and submit Form 44.

6.2 Types of AWOPS supported by the IOMAR

6.2.1 Low Visibility Take-Off (LVTO)

A Low Visibility Take-Off (LVTO) means a take-off with an RVR lower than 400 m but not less than 125 m. An Operator of an aeroplane registered in the Isle of Man may apply for a LVTO Approval.

6.2.2 CAT II

A CAT II approach is a precision instrument approach and landing using ILS/MLS with a DH below 200 ft but not lower than 100 ft and with an RVR not less than 300 m.

6.2.3 CAT IIIA

CAT IIIA approach is a precision instrument approach and landing using ILS/MLS with a DH below 100 ft and with an RVR not less than 200 m.

6.2.4 CAT IIIB

A CAT IIIB approach is a precision instrument approach and landing using ILS/MLS with a DH lower than 100 ft or no DH and an RVR less than 200 m but not less than 75 m.

6.2.5 Enhanced Vision System / Head Up Display (EVS/HUD)

(Note – the EVS/HUD Exemption will be referenced on the Operations Specification Certificate. This will be issued by the Registry as an Exemption.)

An Enhanced Vision System (EVS) is an electronic means to overlay an image of the forward surrounding topography on a head up display (HUD), allowing the pilot to see the surrounding terrain in low visibility conditions. Using an EVS, an aircraft may descend to 100 ft above the runway threshold elevation and in a minimum RVR of 350 m subject to an exemption issued by the IOMAR. An exemption can only be granted for infrared systems that utilise a HUD as part of the EVS equipment. The infrared EVS performance can vary depending on the weather conditions encountered.
Chapter 7: Declaration

By signing Form 4 and/or Form 4a the applicant is making a legal declaration that the aircraft, crew and operators’ procedures meet the requirements and standards for the relevant approvals. Operators requesting ATS Comms & Surveillance Operating Approvals (i.e. FANS 1/A, FANS 1/A+ (PBCS), ATN B1 or ADS-B) are also confirming compliance with the applicable declaration statements contained in this RP.

The Registry will only accept a Form 4 and/or Form 4a signed by either the Operator Contact(s) or Flight Operations Representative as recorded on the current Form 20 for the aircraft.