

EGNOS

EGNOS, it's there. Use it.

APPROVED

EGNOS HOW TO Obtain RNP APCH operational approval to LPV minima in Europe



European
Global Navigation
Satellite Systems
Agency



Precise navigation,
powered by Europe



<http://egnos-portal.gsa.europa.eu/>
<http://egnos-user-support.essp-sas.eu>





The following document provides a set of simple guidelines for Aircraft Operators within the European Civil Aviation Conference (ECAC) area to facilitate their operational approval by their national authorities to perform Localizer Performance with Vertical guidance (LPV) operations. It has been prepared by European Satellite Services Provider S.A.S. (ESSP SAS) under its EGNOS Service Provision contract with the European Global Navigation Satellite Systems Agency (GSA).

This document is published for information purposes and does not commit ESSP and/or the GSA. It may be copied in whole or in part for non-commercial purposes only (not for sale), provided that the sources involved in the preparation of the document are acknowledged. The information in this document shall not be modified without prior written permission from GSA.

Released: October 2015

For questions and further information

EGNOS HELPDESK

+34 911 236 555

egnos-helpdesk@essp-sas.eu

<http://egnos-user-support.essp-sas.eu/>

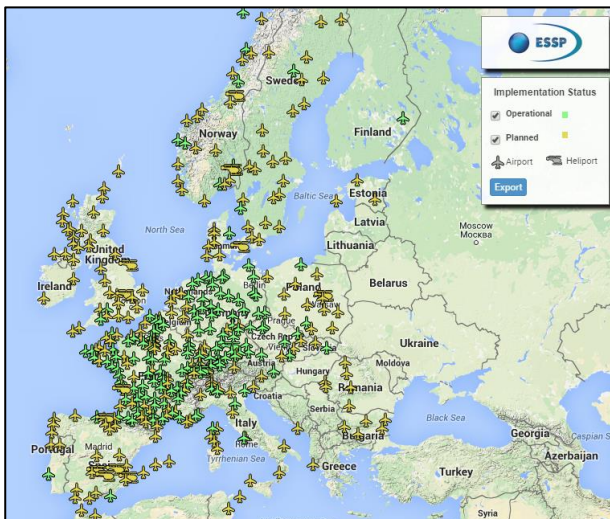
Table of Contents

| | | |
|-------------------|---|-----------|
| 1 | Summary of contents | 4 |
| 2 | WHAT ARE LPV APPROACH PROCEDURES? | 6 |
| 3 | CURRENT MEANS to OBTAIN LPV OPERATIONAL APPROVAL | 7 |
| 4 | Preliminary certification requirements | 8 |
| 5 | OPERATIONAL PROCEDURES AND OPERATIONAL MANUAL AMENDMENTS | 10 |
| 5.1 | Operational Procedures Update | 10 |
| 5.1.1 | Operational characteristics of the procedure | 10 |
| 5.1.2 | Standard operating procedures | 11 |
| 5.2 | Operations Manual Update | 11 |
| 5.3 | Navigation Database Management | 14 |
| 5.3.1 | Reportable events | 15 |
| 6 | Crew training and training package update | 15 |
| 7 | APPLICATION FOR OPERATIONAL APPROVAL | 16 |
| 8 | EU MEMBER STATES SINGULARITIES | 17 |
| 9 | Mid-term evolution of European regulation on PBN | 20 |
| Appendix A | Normal and Abnormal Operating procedures | 24 |
| Appendix B | Training requirements | 27 |
| Appendix C | REFERENCE DOCUMENTS AND ACRONYMS | 31 |
| Appendix C.1 | Reference documentation | 31 |
| Appendix C.2 | Acronyms | 32 |

1 SUMMARY OF CONTENTS

What are LPV approaches?

Technically known as RNP Approach procedures down to LPV minima, LPVs were introduced within the PBN concept as new approach operations based on SBAS, a technology providing augmentation to GNSS systems like GPS. This type of approaches allows for ILS look-alike procedures down to a minimum as low as 200ft without the need of any ground infrastructure installation. As of August 2015, there are over 200 LPV procedures published in Europe with plans for more than 400 by 2017 (see map below, available [here](#)).



In addition, an Implementing Rule has been published by EASA in 2015 to support the implementation of APV procedures. You can find more details on this rule and LPVs characteristics and main benefits in [Section 2](#).

Do I need a Specific Approval to fly them?

If you hold an AOC the answer is yes. If you are an NCC/NCO, then it depends on the specific regulations set by your NSA. Some States require general aviation IR pilots to at least undertake a specific training while others don't have any requirement at all (see [Section 8](#) for more details).

Today, European CAT operators need to apply for a specific approval (SPA) to their competent authority. This is due to the fact that LPVs are a

relatively new concept which require not only the that the aircraft and its navigation avionics have the corresponding airworthiness approval but also that pilots have appropriate training and checking standards and operational procedures in place.

Is the regulation expected to change?

Yes, fortunately, LPVs and other PBN specifications will be soon considered as standard practices becoming part of the IR license of pilots and standard operators' procedures by default. These changes are currently reflected in EASA Opinion 03/2015 which has been addressed to the EC to amend the corresponding Commission Regulations by August 2016.

These changes will eliminate the burden to apply for an SPA but operators will still be required to put the necessary operational procedures in place and accordingly amend their operational manuals to obtain the approval from their authorities, as it happens nowadays with other instrument approach procedures. [Section 9](#) provides more insight to the upcoming changes to regulation.

How can I get approved?

Granting an operational approval is responsibility of the national regulatory authority. This is the State of the Operator for CAT and the State of Registry for NCC/NCO. The approval is issued when the operator has demonstrated that the specific aircraft are in compliance with the relevant airworthiness standard and that flight operations requirements are satisfied.

AMC 20-28 is the current reference document providing EASA airworthiness and operational requirements for the use of LPVs. Check [Section 3](#) for more details.

For CAT operators, the process involves changes to their current operating procedures, their operation manuals and training programs

together with a formal application to their authority while, for NCC/NCO, this could simply imply changes to their Operating Handbooks and providing evidence to their authority that the appropriate training has been undertaken.

What are the necessary steps?

There are four main set of actions that the operator must complete to receive approval:

1. First, ensure that the aircraft **airworthiness requirements** for this type of operations are met.

If the aircraft is not designed and type-certified for RNP APCH down to LPV minima operations (documented in the AFM or TC) the operator should seek for applicable EASA approved SBs or STCs for that particular aircraft model and variant or liaise with a design organisation for the development of one if there are no solutions available.

You can find more details in [Section 4](#).

2. Second, **amend the operational procedures and corresponding manuals** to account for this type of operations.

As it happens with other approach procedures which are operated under IFR, there are certain operational criteria which apply to the use of LPVs. The way the installed equipment is operated must be in accordance with the AFM or POH. For example, the MEL should be amended to identify the minimum equipment necessary to satisfy these LPV approach operations and the operator should determine the operational characteristics of the procedure to be flown, which must be reflected on the Operational Manual.

[Section 5](#) provides guidance on the update of these operational procedures and the corresponding aircraft documentation, including the specific chapters, sections and subsections which should be amended in the Operational Manual.

3. Third, **update the training** and checking programs and **train the crew** accordingly.

Until the previously mentioned EC regulation introduces PBN in the standard IR license, operators willing to make use of LPVs will need to provide the necessary training, briefings and guidance material to their flight crew.

The training program should be structured to provide sufficient theoretical and practical training using a simulator, training device, or line training in an aircraft, in the concept of RNAV GNSS and RNP approaches and the use of the aircraft's approach system in such operations.

[Section 6](#) provides more details on the different aspects that should be added to the regular training program.

4. Fourth and final, **submit a formal application** to the competent authority.

Once the previous actions are completed, the operator must elaborate a written proposal to the regulator with evidences of these changes.

These evidences are normally extracts from the AFM or POH and STC or SB documentation for the airworthiness part and extracts from the Operational Manuals and copies of ATOs/PTOs training for the operational part.

Once the NSA evaluates the application and agrees that the requirements are met, the operational approval is given via an amendment to the OM, an Ops Spec associated with the AOC, or a LOA in the case of non-commercial operator.

Some regulators have published application forms and guidance material to assist the operator during this process.

More details on the application process and an example of what the application form should contain are given in [Section 7](#).

Reference documentation and acronyms

Documentation of reference EC and a list of acronyms can be found in [Appendix C](#).

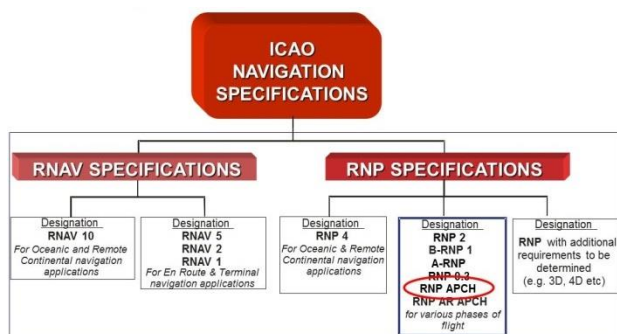
2 WHAT ARE LPV APPROACH PROCEDURES?

LPV within the PBN concept

The PBN concept, published within the Performance-Based Navigation Manual (Doc 9613). - 4th edition, 2013 [RD-5], defines performance requirements for aircraft navigating on an ATS route, terminal procedure or in a designated airspace.

Through the application of Area Navigation (RNAV) and Required Navigation Performance (RNP) specifications, PBN provides the means for flexible routes and terminal procedures helping the global aviation community to reduce aviation congestion, save fuel, protect the environment and maintain reliable, all-weather operations, even at the most challenging airports. It provides ANSP and operators with greater flexibility and better operating returns while increasing the safety of regional and national airspace systems.

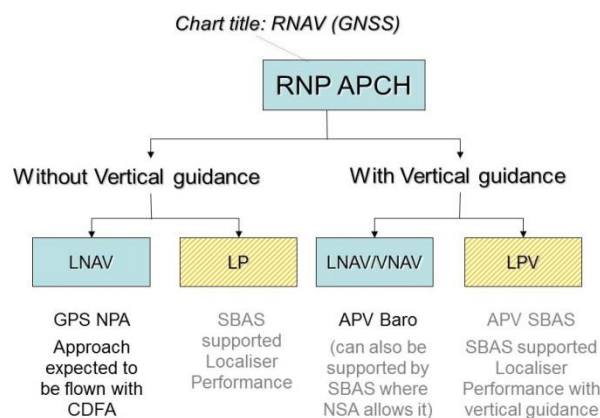
GNSS is identified as a key enabler for most of the navigation specifications defined. Notably SBAS and therefore EGNOS is a key enabler for procedures based on the RNP APCH Navigation Specification. The following figure shows in a schematic way the ICAO PBN Navigation Specification classification included in the PBN manual.



Source: Eurocontrol

RNP APCH procedures allow four minima lines: LP, LNAV, LNAV/VNAV and LPV. The RNP APCH procedures are published on charts with the title RNAV (GNSS) RWY XX.

The following figure shows the different RNP APCH procedures included within the RNP APCH navigation specification:



Source: Eurocontrol

Within the ECAC area EGNOS is the main driver for RNP APCH procedures down to LPV minima, allowing for Decision Heights as low as 200ft.

LPV benefits

LPV approaches enabled by EGNOS SoL service provide the following general benefits compared to conventional NPAs:

- Minima reduction, currently down to 250ft and as low as 200ft in specific locations based on the LPV-200 Service Level capability, which can allow successful approaches in conditions that would otherwise disrupt operations compared to conventional NPAs and therefore increase accessibility.
- Safety increase thanks to vertical guidance provided to the aircrew during the approach. This makes the approach easier to fly and reduces the risk of controlled flight into terrain (CFIT).
- Operational Benefits:
 - Reduces trajectory dispersion (predictability and noise footprint reduction);
 - CDO techniques (fuel consumption reduction and noise footprint reduction);
 - More flexible use of airspace;
 - LPVs offer straight-in approaches in some cases where this is not otherwise

possible with conventional NPAs and they also allow the offset (angle) as in some ILS approaches;

- LPVs offer the potential to remove circling approaches.
- Infrastructure rationalization:
 - LPV approaches will be most beneficial at runway-ends where there is no ILS already available;
 - Potentially enabling VOR, NDB, ILS removal/back-up reducing the associated installation / maintenance costs (in accordance with airlines equipage and/or interests).

The number of LPV publications has rapidly increased in Europe since the declaration of the SoL service on the 2nd of March 2011, counting on more than 200 procedures available as of August 2015. The current implementation status and future trends, which plan for having more than 400 LPVs by 2017, can be checked in the EGNOS User Support website (<http://egnos-user-support.essp-sas.eu/>).

Implementing Rule

In addition to these publications coming from individual ANSPs' and airport operators' initiatives, EASA is putting in place an implementation mandate. The NPA 2015/01 "PBN implementation in the European Air Traffic Management Network (EATMN)" [RD-6], addresses the safety, interoperability, proportionality and coordination issues related to the implementation of PBN within European airspace. Among other things, this NPA proposes that Air Traffic Service Providers and aerodrome operators implement PBN approach procedures with vertical guidance (APV) RNP APCH at all instrument runway ends where there are currently only non-precision approach procedures published before January 2024.

Although there is no specific mandate on aircraft equipage, operators wishing to operate these routes and procedures will be required to ensure that their aircraft and flight crew are approved for PBN operations. As indicated in the before mentioned NPA, the publication date of the Decision is planned for Q4 2015.

3 CURRENT MEANS TO OBTAIN LPV OPERATIONAL APPROVAL

As with any instrument procedure, performing LPV approaches requires that the aircraft meets certain airworthiness certification standards, including the necessary navigation system performance and functionality, and that the operator has operational approval from an appropriate regulatory body before the system can be used.

However, while conventional procedures such as VOR or DME are a standard part of the pilot's Instrument Rating license and standard operating procedures, LPVs are relatively new and, as any other PBN concept, require additional training and a specific approval from the regulatory authority of the State of Registry. This will change in the future, as it is described in [Section 9](#), but until it does, operators wishing to perform RNP APCH operations down to LPV minima will have to apply for these specific approvals (SPA) to their competent authority demonstrating that the aircraft are in compliance with the relevant airworthiness standard and that the continued airworthiness and flight operations requirements are satisfied.

In Europe, the applicable regulation covering the certification and operational aspects for LPVs is **EASA AMC 20-28** "Airworthiness Approval and Operational Criteria related to Area Navigation for Global Navigation Satellite System approach operation to Localiser Performance with Vertical guidance minima using Satellite Based Augmentation System" [RD-10].

This AMC provides an acceptable means that can be used by the operator to obtain airworthiness approval for their aircraft, which is granted by EASA, and the operational approval, which is granted by the NSA. This AMC is a temporary solution until the corresponding CS and Air Ops regulations are amended to introduce PBN.

The document is equivalent to the US Advisory Circulars AC 20-138 "Airworthiness Approval of Positioning and Navigation Systems" and AC 90-107 [RD-10] "Guidance for Localizer Performance

with Vertical Guidance and Localizer Performance without Vertical Guidance Approach Operations in the U.S. National Airspace System” published by the FAA. The former provides the airworthiness requirements while the latter covers the operational aspects.

Private operators might not be required to follow the same authorization model as AOC holders although a State may determine that a letter of authorization (LOA) is also necessary for them. In this case the operator must ensure that the aircraft has got suitably approved equipment (is eligible), the navigation database is valid, the pilot is suitably qualified and current with respect to the equipment, and adequate procedures (and checklists) are in place.

The following sections provide a set of common guidelines based on the AMC 20-28 document and are complemented by ICAO Doc 9997 [RD-7] material. These are structured as follows:

- [Section 4](#) provides a set of preliminary requirements like the airworthiness certification of the aircraft for this type of operations;
- [Section 5](#) describes the necessary amendments to the operational procedures and manuals;
- [Section 6](#) provides a series of necessary amendments to the Syllabus training programme;
- [Section 7](#) elaborates on the formal application process to the competent authority.

4 PRELIMINARY CERTIFICATION REQUIREMENTS

The airworthiness certification of the aircraft to conduct RNP APCH procedures down to LPV minima is a prerequisite for the granting of the operational approval. Operators seeking information on how to achieve this airworthiness certification are encouraged to review the LPV Implementation Guidelines for Airports and Operators developed by ESSP [RD-4]. The document is freely available in the EGNOS User

Support website (<http://egnos-user-support.essp-sas.eu/>).

Although the present guidelines do not deepen in this preliminary step, some clarifications on this matter are given below.

As a start, the aircraft navigation avionics must be EASA ETSO-C145 or ETSO-C146 certified by the manufacturer as to be able to receive and process the SBAS correction messages. There are numerous devices from Bendix King, Esterline-CMC, Garmin, Honeywell, Rockwell Collins, Thales, and Universal which have received such certification¹. On top of it, the complete cockpit installation must be compliant with the airworthiness requirements stated in AMC 20-28.

There are different ways to demonstrate the eligibility or airworthiness certification of an aircraft for an LPV operational approval application:

a) **Through its original Type Certificate (TC)**

The TC is the approved standard for the production of a specified type/series of aircraft. The aircraft specification for that type/series, as part of the TC, will generally include a navigation standard. The aircraft documentation for that type/series will define the system use, operational limitations, equipment fitted and the maintenance practices and procedures.

There are a large number of new manufactured aircraft which offer SBAS certification by default like Bombardier CRJ 700, 900, 1000, Q400 for regional aviation. Most new business and general aviation models from Bombardier, Cessna Embraer, Gulfstream, Hawker, Pilatus, Dassault, Piper, Cirrus or Diamond are certified for the use of LPVs too.

It is important to highlight that, for recently manufactured aircraft, where the PBN capability is approved under the TC, there may be a statement in the AFM limitations section

¹ A detailed EASA list of ETSO authorisations can be found at: <http://easa.europa.eu/easa-and-you/aviation-domain/aircraft-products/etso-authorisations>

identifying the operations for which the aircraft is approved.

For those aircraft which are not certified from factory (via TC), certain retrofitting or forward fitting modifications are needed, as explained below.

b) **Through a Supplemental Type Certificate (STC)**

EASA can approve aircraft changes through a modification approval process or STC. Although airworthiness certification via STC is granted by EASA, the operator will use it as proof of aircraft eligibility in front of the corresponding NSA, responsible of granting the operational approval. STCs are developed by Part 21 Approved Organisation which design the necessary changes to the aircraft equipment and its configuration and must achieve certification of the first conversion aircraft by EASA.

There are several examples of STCs available for different aircraft models like the Boeing 737, Fokker 50, Bombardier CL600 and legacy ATR 42/72. In the case of business and general aviation, Applicable Model List (AML) STCs exist for Garmin avionics covering a wide range of aircraft.

c) **Through a Service Bulletin (SB):**

Another means of modifying an aircraft is through an approved Service Bulletin (SB) issued by the aircraft manufacturer. The SB is a document approved by the State of Design to enable changes to the specified aircraft type, and the modification then becomes part of the type design of the aircraft. Its applicability will normally be restricted by airframe serial number.

The State of Registry -or in the case of Europe, EASA- accepts the application of an SB and changes to the maintenance programme, while the State of the Operator accepts changes to the maintenance programme and approves changes to the MEL, training programmes and operations specifications. An OEM SB may be obtained for current-production or out-of-production aircraft.

For example, SBs are available to Airbus 350, ATR 42-600 and 72-600, Bombardier Dash 8, Embraer E-Jets, Piaggio, Gulfstream G150/G550/G450/G350, Pilatus and Dassault Falcon models.

d) **Through a compliance statement from the manufacturer**

This should have been approved by the State of Design and accepted by the State of Registry or the State of the Operator, if different. In many cases for legacy aircraft, while the aircraft is capable of meeting all the airworthiness requirements of a PBN navigation specification like RNAV-5, there may be no clear statement in the applicable TC or STC or associated documents (AFM or equivalent document). In such cases, the aircraft manufacturer may elect to issue an SB with an appropriate AFM update or instead may publish a compliance statement in the form of a letter, for simple changes, or a detailed aircraft-type-specific document for more complex changes. The State of Registry may determine that an AFM change is not required if it accepts the OEM documentation.

To summarise, if the aircraft is designed and type-certified for LPV operations (documented in the AFM or TC) there is no action required by the operator but to attach this documentation to the operational approval application form to their NSA.

If the aircraft is not LPV type-certified, the operator should seek for applicable SBs or STCs from the manufacturer or Part 21 approved organisations for that particular aircraft model and variant and perform necessary the aircraft modifications. If there are not EASA approved SBs/STCs solutions, the operator will then have to pursue the development of a new one liaising with a design organisation, implementing the corresponding changes to the aircraft and achieving the necessary STC certification.

5 OPERATIONAL PROCEDURES AND OPERATIONAL MANUAL AMENDMENTS

As it happens with other approach procedures which are operated under IFR, there are certain operational criteria which apply to their use, according to EU legislation. LPVs are not an exception and, therefore, the way the installed equipment is operated must be in accordance with the AFM or the POH. For example, the MEL should be amended to identify the minimum equipment necessary to satisfy these LPV approach operations and the operator should determine the operational characteristics of the procedure to be flown, which must be reflected on the Operational Manual.

The following sections provide a set of extended recommendations from those given by AMC 20-28 on the update of these operational procedures and corresponding aircraft documentation.

5.1 Operational Procedures Update

The operational characteristics of the procedure as well as normal and abnormal procedures must be amended and documented:

5.1.1 Operational characteristics of the procedure

Before planning a flight to an aerodrome (destination or alternate) with the intent to use a LPV approach procedure contained in the Navigation Database, the operator should determine the operational characteristics of the procedure in accordance with ORO.FC.105 of EC 965/2012 [RD-3] and the corresponding AMCs or the applicable operational regulations.

Based on this assessment, the appropriate information should be given to the crew. If the aerodrome access requires a specific competence, the designated crew shall have a validated competence. Depending upon the type of operation being undertaken the

operator should consider the following (Appendix 2 to AMC 20-28):

- a) The provision of evidence of an evaluation of any new or modified LPV approach procedures. Particular attention should be paid to procedures:
 - in mountainous environment;
 - within the proximity of well-known obstacles; and
 - that may require adequate knowledge for the aerodrome access or aerodrome competence qualification, as specified in ORO.FC.105 of EC 965/2012 and the corresponding AMCs [RD-3], former EU-OPS 7.975 or the applicable operational requirements.
- b) That competence may be required specifically for an LPV approach procedure or the procedure may be published for an aerodrome already listed as requiring an aerodrome competence. The required competence may be aircraft type related and subject to periodic revalidation. Particular attention should be paid to procedures that:
 - are not in radar coverage;
 - have missed approach trajectories involving turns, especially at low altitudes;
 - are subject to a declared exemption to the procedure design rules specified by the ICAO PANS OPS; and
 - every other case considered necessary to be evaluated by the operator.
- c) The development of an internal process (e.g. filtering methods or tools covering the AIP review) to detect LPV approach procedure(s) showing one or more of the above-listed characteristics.
- d) The operational evaluation of a LPV approach procedure showing evidence of the above mentioned operational characteristics which 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 flyable with the aircraft type.

5.1.2 Standard operating procedures

Standard Operating Procedures (SOPs) must be developed to cover both normal (pre-flight planning, prior and during procedure) and abnormal (contingency) procedures for the systems used in the LPV operation.

These Standard Operating Procedures are set in Appendix 3 to AMC20-28 and can be found in Appendix A to this document.

5.2 Operations Manual Update

The relevant parts and sections of the Operations Manual (e.g. Aircraft Operations Manual, check lists, training of crew) should be revised to take account of the operating procedures detailed above. The operator should make timely amendments to the Operations Manual to reflect relevant procedure and data base checking strategies. Manuals and check lists may need to be submitted for review by the competent authority as part of the approval process (Section 9 in AMC20-28):

For new or modified aircraft, the AFM or the POH, whichever is applicable, should provide at least the following information:

- a) A statement which identifies the equipment and aircraft build or modification standard certified for RNAV GNSS approach operation to LPV minima using SBAS. This may include a very brief description of the installed system, including the airborne equipment minimum software version, display equipment and a statement that it is suitable for LPV approach operations. A brief introduction to the LPV approach concept may also be included.

- b) Appropriate amendments or supplements to cover LPV approach operation in the following sections:

- Limitations - including use of Lateral and Vertical deviations, FD and AP; currency of navigation database; crew verification of navigation data.
- Normal Procedures
- Abnormal Procedures - including actions in response to a Loss of Integrity in response to a degradation of the GNSS approach mode (e.g. downgrade from LPV to LNAV).

Note: This limited set of information assumes that a detailed description of the installed system and related operating instructions and procedures are available in other operating or training manuals.

The following table provides a non-exhaustive list of parts, chapters and sections of a standardised² Operational Manual shall be amended accordingly:

² According to the content and structure given in AMC to Part ORO, Initial issue dated 25/10/12: AMC3 ORO.MLR.100 Operations manual – general CONTENTS – COMMERCIAL AIR TRANSPORT OPERATIONS

Table 1–Operational Manual impacted parts chapter and sections.

| Chapter | Section | Subsection | Amendments | | |
|---------------------------------------|---|--|--|---|--|
| Part A. General/Basic | | | | | |
| OM-A | 0. Administration and control of OM | 0.1 Introduction | (d) Explanations and definitions of terms | New RNP definitions and abbreviations | |
| | | 0.2 System of amendment and revision | | Revision update | |
| | 1. Organisation and responsibilities | 1.3 Responsibilities and Duties | | New functions/responsible: - NAV data handling, quality and control - Compliance with RNP APCH Ops Specs (Ch.7 AMC 20-28) | |
| | 2. Operational control and supervision | 2.2 System and responsibility for promulgation of additional operational instructions and information | | NAV database updating process | |
| | | 2.3 Operational control | | - RNP APCH related information distribution process for safe operation - Aerodrome categorisation | |
| | 3 Management system | Quality System – duties and responsibilities | | NAV data handling, quality and control process | |
| | 5 Qualification requirements | 5.1 A description of the required licence, rating(s), qualification/competency (e.g. for routes and aerodromes), experience, training, checking and recency for operations personnel to conduct their duties. | | Crew Authorisation required/validation. | |
| | 8. Operating Procedures | 8.1 Flight preparation instructions. | 8.1.2 Criteria and responsibilities for determining the adequacy of aerodromes to be used | | - RNP procedure operational evaluation - Use of NOTAM/RAIM to select destination / alternate aerodrome ³ |
| | | | 8.1.3 Methods and responsibilities for establishing aerodrome operating minima. | | Calculations for RNP APCH operations (e.g. RVR and DA(H)) |
| | | | 8.1.5 Presentation/application of aerodrome operating minima | | APCH charts presentation, i.e. RNAV (GNSS) |
| 8.1.9 ATS flight plan | | | Explanation on ATS flight plans submission (state RNP APCH capability ⁴). | | |
| 8.1.10 Operational flight plan | | | Procedures for elaboration and submission of operational flight plans for RNP APCH. | | |

³ As stated in AMC 20-28: “The operator shall only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.”

⁴ Check for Eurocontrol guidance on how to fill in NAV/COM/SUR information in Flight Plans at

<https://www.eurocontrol.int/sites/default/files/article//content/documents/nm/flight-planning/icao-2012/icao-2012-guidance-latest.pdf>



| Chapter | Section | Subsection | Amendments |
|--|---|--|--|
| OM-A | 8. Operating Procedures | 8.3.2 Navigation Procedures. A description of all navigation procedures, relevant to the type(s) and area(s) of operation. Special consideration given to: <ul style="list-style-type: none"> a. standard navigational procedures; and b. RNP and Minimum Navigation Performance Specification c. in-flight re-planning; d. procedures in the event of system degradation; | Update: <ul style="list-style-type: none"> - RNAV/RNP concepts including NOTAM; - Crew qualification - Database (Type 2 LoA) - Normal and abnormal procedures (see Appendix A) - Radiotelephony, RTF phraseology - Navigation accuracy assessment at dispatch, for destination and alternates; |
| | | 8.6 Use of the minimum equipment and configuration deviation list(s). | MEL handling. |
| | 11. Handling and reporting occurrences | Procedures for handling, notifying and reporting accidents, incidents and occurrences. | |
| B. Aircraft Operating Matters – Type Related | | | |
| OM-B | 1. Limitations | Description of the certified limitations and the applicable operational limitations: Certification status - EASA (S)TC, Types of approved operations (RNP APCH) and Navigation System limitations | Update STC/TC certification and approved operations |
| | 2. Normal procedures | | See Appendix A and functional criteria in Ch.7 AMC 2028 |
| | 3. Abnormal and/or emergency procedures | | See Section Appendix A |
| | 9. Minimum Equipment List (MEL) | | Include dispatch conditions for RNP APCH. |
| | 12. Aircraft Systems | | Update on RNP APCH navigation capability |
| Part C. Route/Role/Area and Aerodrome/Operating Site Instructions | | | |
| OM-C | 1 | Instructions and information relating to communications, navigation and aerodromes/operating sites including minimum flight levels and altitudes for each route to be flown and operating minima for each aerodrome/operating site planned to be used, including the following | <ul style="list-style-type: none"> - Operating minima - Navigation aids and Communications - Charts description |
| Part D. Training | | | |
| OM-D | 1 Description of scope: Training syllabi and checking programmes for all operations personnel assigned to operational duties in connection with the preparation and/or conduct of a flight. | | Setup training program (modules): purpose, scope, requirements, conditions, instructors, etc. |
| | 2 Training syllabi and checking programmes | 2.1 for flight crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-SPA) and ORO.FC; | Ground and FSTD/Airplane practical training and checking. See Section 6 . |
| | | 2.5 for operations personnel other than crew members (e.g. dispatcher, handling personnel etc.) | RNP APCH training for supervisors and other than crew personnel |
| 3 Procedures | 3.1 Procedures for training and checking. | Include RNP APCH procedures and simulator/training devices selection criteria | |

5.3 Navigation Database Management

Navigation databases are required for RNP APCH navigation specifications and the procedures for maintaining currency, checking for errors and reporting errors to the navigation database supplier must be documented in the operations and maintenance manual (Section 10.4 in AMC20-28). According to CAT.IDE.A.355 "Electronic navigation data management" in [RD-3] (former EU-OPS 1.873):

- a) The operator shall only use electronic navigation data products that support a navigation application meeting standards of integrity that are adequate for the intended use of the data.
- b) When the electronic navigation data products support a navigation application needed for an operation for which Annex V (Part-SPA) requires an approval, the operator shall demonstrate to the competent authority that the process applied and the delivered products meet standards of integrity that are adequate for the intended use of the data.
- c) The operator shall continuously monitor the integrity of both the process and the products, either directly or by monitoring the compliance of third party providers.
- d) The operator shall ensure the timely distribution and insertion of current and unaltered electronic navigation data to all aeroplanes that require it.

The bullet points above affect operators involved in the operation of aircraft for commercial air transportation. However, operators not involved in commercial air transport are also requested not to use a navigation database for LPV approach operations unless the navigation database supplier holds a Type 2 LoA⁵ or equivalent.

⁵ An 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 January 2005. The FAA issues a Type 2 LoA in accordance with AC 20-153, while Transport Canada (TCCA) issues an Acknowledgement Letter of an

The LPV approach is characterised in the navigation database by the FAS Data Block protected by a CRC. The FAS Data Block contains the lateral and vertical parameters, which define the approach to be flown. Those parameters have been calculated, validated and promulgated by the Air Navigation Service Provider. In addition, each FAS Data Block ends with a CRC, which wraps around the approach data. Consequently, the integrity is ensured when the airborne equipment making use of the data successfully passes the CRC on the data block.

In addition, according to ICAO Doc 9997 [RD-7], the packed navigation databases should be delivered to the operator at least one week prior to the AIRAC effective date. The operator should have procedures in place for ensuring that:

- a) the correct version of the navigation database is loaded on the aircraft;
- b) any database errors/omissions reported by the suppliers are addressed expeditiously by flight crew briefing/removal of procedures, etc.;
- c) any database errors/omissions reported by the flight crew are addressed expeditiously by flight crew briefing/removal of procedures and reported back to the database suppliers;
- d) the version of the loaded navigation database is checked for validity by the flight crew prior to departure;
- e) prior to use after being loaded into the area navigation system, the procedure is checked against the chart, by the flight crew, for waypoint sequence, waypoint transition, leg length, magnetic bearing, altitude constraint and speed constraint.

Aeronautical Data Process using the same basis. Both the FAA LoA and the TCCA Acknowledgement Letter are seen to be equivalent to the EASA LoA.

EUROCAE/RTCA document ED-76/DO-200A Standards for Processing Aeronautical Data contains guidance relating to the processes that the supplier may follow. The LoA demonstrates compliance with this standard.

5.3.1 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 (Section 10.4.3 in AMC20-28). The operator should have in place a system for investigating such an event to determine if it is due to an improperly coded procedure, or a navigation data base error. Responsibility for initiating corrective action rests with the operator.

For those operators for whom approval is granted under IR-OPS [RD-3], Technical defects and the exceeding of technical limitations, including the following events, should be the subject of Occurrence Reports (see DIRECTIVE 2003/42/EC⁶, former EU-OPS 1.420):

1. Total loss or multiple navigation equipment failures
2. Total or multiple air data system equipment failures
3. Significant misleading indications
4. Significant navigation errors attributed to incorrect data or a database coding error
5. Unexpected deviations in lateral or vertical path not caused by pilot input
6. Problems with ground navigational facilities leading to significant navigation errors not associated with transitions from inertial navigation mode to radio navigation mode.

6 CREW TRAINING AND TRAINING PACKAGE UPDATE

As it was mentioned before, the new EC regulation will adapt Part FCL rules on training and checking to the new requirements in TK and PS to cover PBN. Therefore new IR holders⁷ will

⁶ To be repealed by EC No 376/2014 on the 15th of November 2015

⁷ It is worth noting that the a new type of instrument rating license called En-route Instrument Rating (EIR) was introduced as FCL.825 by CR (EU) No 245/2014 of 13 March 2014 [RD-13], amending Commission Regulation (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew.

be entitled to fly LPVs among other PBN operations while existing IR holders will need to update their TK on PBN on the first periodic check.

In the meantime, operators willing to make use of LPV approach procedures will need to provide the necessary training, briefings and guidance material to their flight crew. The operator should ensure that during line operations Flight Crew can perform assigned duties reliably and expeditiously for each procedure to be flown in normal and abnormal operations.

The training program should be structured to provide sufficient theoretical and practical training using a simulator, training device, or line training in an aircraft, in the concept of RNAV GNSS approach operations to LPV minima and the use of the aircraft's approach system in such operations to ensure that Flight Crew are not just task-oriented.

The following general knowledge requirements given in ICAO Doc 9997 [RD-7] could apply not only to RNP APCHs but also to other PBN specifications:

1. Area navigation principles. Area navigation is the basis for all PBN operations, and the same general knowledge is applicable to all navigation specifications.
2. Navigation system principles. Flight crews should have a sound knowledge of the navigation system to be used.
3. Equipment operation and functionality. Considerable variation exists in the operation of navigation equipment, cockpit controls, displays and functionality. Crews with experience on one type of installation or aircraft may require additional training on another type of equipment. Special attention should be paid to the differences between stand-alone GNSS equipment and flight management systems with GNSS updating and degraded modes of operation such as loss of integrity or loss of GNSS.

4. Flight planning. Knowledge of the relevant aspects of each of the navigation specifications that relate to flight planning is required.
5. Operating procedures. RNP APCH requires a detailed knowledge of standard operating procedures for both normal and non-normal operations.
6. Performance monitoring and alerting. Flight crew responsibilities with respect to performance monitoring and alerting provided by the navigation system must be clearly understood.
7. Operating limitations. Operating limitations (e.g. time limits, minimum equipment) vary both between and within the navigation specifications, and flight crews need to be able to recognize this and plan accordingly. Alternative means of navigation or other contingency procedures must be addressed.

Regarding flight training, in the course of operational approval evaluation, all relevant circumstances need to be considered and the training assessed for completeness and effectiveness. Ongoing and recurrent training should be considered. In the case of RNP APCH, flight training can be split in two types: stand-alone GNSS equipment and FMS equipment:

- a. The training for RNP APCH operations using stand-alone GNSS equipment, particularly in a single pilot aircraft, normally requires multiple in-flight exercises, each with pre-flight and post-flight briefing. Considerable attention should be given to the programming and management of the navigation system, including in-flight re-programming, holding, multiple approaches, mode selection and recognition, human factors and the navigation system functionality;
- b. Approaches conducted in FMS-equipped aircraft are generally much easier to manage because the aircraft are usually equipped with map displays which increase situational awareness. Normal operations are quite

simple, and competency can be achieved with one or two approaches. Additional training should be provided to ensure familiarity and competency in operations which involve changes to the planned approach, system alerting and missed approaches. Attention should also be given to the method of vertical navigation to LNAV minima, to LNAV/VNAV minima and to LPV minima. Crews with previous relevant GNSS and area navigation experience can usually achieve competency during one full flight.

AMC 20-28 provides a list of minimum amendment to the Syllabus training programme which is copied in Appendix A to this document. In addition, the PBN concepts introduced by Opinion No 03/2015 as new LOs are also detailed in Appendix A.

The ESSP and PPL/IR have developed training material covering these LOs as reference which can be found here:

- EGNOS website: [Training Material](#)
- PPL/IR website: [PBN Manual](#)

7 APPLICATION FOR OPERATIONAL APPROVAL

An operational approval may be documented through:

- a) an amendment to the Operations Manual (OM), if required; and
- b) an Operations Specification (Ops Spec), associated with the Air Operator Certificate (AOC); or
- c) a Letter Of Authorization (LOA) for general aviation aircraft.

The approval process usually consists of the following phases:

1. **Pre-application phase**. The operator initiates the approval process by reviewing the requirements set in the previous sections of this document; establishing that the aircraft, the operating procedures, the maintenance procedures and the training meet the

requirements; and developing a written proposal to the regulator.

Some regulators have published application forms and guidance material to assist the operator in gathering the necessary evidence to support the approval application (see Section 8 for more details). At this stage, a pre-application meeting with the regulator can also be very beneficial. If the proposed application is complex, the operator may need to obtain advice and assistance from OEMs or other design organizations, training establishments, data providers, etc.

2. **Formal application phase.** The operator submits to the NSA a formal, written application for approval, which appoints a project manager (either for the specific RNP APCH to LPV approval or for PBN approvals generally).

An example of the submission matrix that an application form could contain is given in Table 2 below.

3. **Document evaluation phase.** The NSA project manager evaluates the formal, written application for approval to determine if all the requirements are being met. If the proposed application is complex, the project manager may need to obtain advice and assistance from other organizations such as regional agencies or experts in other States.
4. **Demonstration and inspection phase.** During a formal inspection by the project manager (assisted as necessary by a NSA team), the operator demonstrates how the requirements are being met.
5. **Approval phase.** As it was previously noted, the operational approval following a successful formal inspection by the NSA is given via an amendment to the OM, an Ops Spec associated with the AOC, or a LOA for general aviation aircraft.

8 EU MEMBER STATES SINGULARITIES

As it was noted all along the document, AMC 20-28 provides acceptable means that can be used by the operator not only to obtain airworthiness approval for their aircraft, which is granted by EASA, but it also proposes a series of operational criteria to be used as acceptable means to grant an operational approval. However, the latter is competence of the individual States and therefore some differences may arise from country to country. This is the case, for example, of the additional requirement imposed to non AOC operators by some countries to undertake specific PBN training and provide the appropriate evidence to the authority before being able to operate RNP approaches.

In principle, individual States should publish national regulatory material which addresses the PBN applications relevant to their airspace or relevant to operations conducted in another State by the State's operators or by aircraft on their registry but most States are still pending the elaboration of such material. These regulations may be categorized by operation, flight phase, area of operation and/or navigation specification and it is clear for all that approvals for commercial operations should require specific authorization.

The next release of this document will provide more insight in the peculiarities of the different ECAC States when addressing the operational approval of their registered operators and the lessons learnt from pioneer operators. This will include the existence (or not) of guidance material and specific application forms or questionnaires, the requirements for non AOC operators and, if available, the points of contact of the different departments at the NSA dealing with these approvals.



Table 2--Application form submission matrix example

| Section | Sub-section | Description | |
|--|--|---|---------------------------------|
| 1- Applicant details | Operator details | – Name, AOC number, address, mail, etc | |
| | Airframe details | – Aeroplane Type, Series, Registration, etc | |
| 2- Notes for completion | Applicability | – Operations covered by the application form and limitations. – Reference to regulatory material (i.e. AMC 20-28) and additional guidance (e.g. ICAO Docs 9613, 8168, 9997, other national guidance, etc) | |
| | Submission and enquires | – PoC at NSA for questions and delivery of application. | |
| | Documents to be included | – Copies of all documents referenced in the submission matrix below (relevant section/pages); – Copies of AFM or POH stating compliance with LPV operations; – Copies of EASA/FAA Type 2 LOA of navigation data supplier; – Extracts from Operations Manuals Parts A, B, C and D; – Copies from approved maintenance program evidences (TC) if applicable. – Copies of ATOs/PTOs training courses contents | |
| 3- Operator's submission matrix | | | |
| Item | Sub-item / Description | Reference documentation and requirements | Document reference ⁸ |
| 1.0 Aircraft Airworthiness | Reference to aircraft navigation system capability airworthiness for RNP APCH down to LPV through: i. Aircraft Type Certificate; or ii. Supplemental Type Certificate, or iii. Service Bulletin; or iv. Manufacturer statement and associated AFM (or supplement) documentation. | ETSO-C145c or ETSO-C146c for avionics AMC 20-28 for aircraft: appropriate amendments or supplements to cover LPV operations in the following AFM or POH sections: – Accuracy (NSE, FTE, PDE), integrity and continuity – Flight Display and Full Scale Deflection – FMS/Auto Pilot interface capability – Intermixing of equipment – Loss of Integrity indication – Alert for excessive downward deviation (e.g. TAWS) | |
| Item | Sub-item / Description | Reference documentation and requirements | Document reference |
| 2.0 Operational | Flight Operations Documentation | The relevant parts and sections of the Operational Manual ⁹ , check lists and training | |

⁸ Compliance statement and document reference to be filled in by the applicant (e.g. AFM/POH extracts, Type 2 LOA letters, extract from Ops Manuals, ATO documentation)



| | | | |
|--|--|--|--|
| Criteria | | documentation should be revised. | |
| | Normal Procedures | As indicated in AMC 20-28 Appendix 3 Section 1: <ul style="list-style-type: none"> - Pre-flight Planning, - Prior to commence the Procedure - During the Procedure | |
| | Abnormal Procedures | As indicated in AMC 20-28 Appendix 3 Section 2 | |
| 3.0 Operations Manuals | Part A. General/Basic | <ul style="list-style-type: none"> - Definitions and abbreviations - Responsibilities and duties - Operational control (RNP info, aerodrome categorisation) - Management and quality systems (NAV data) - Qualification requirements for crew - Flight procedures (RNAV concepts; navigation accuracy assessment at dispatch for destination/alternates; phraseology; MEL handling; SOPs; etc) - Incidents and occurrences handling and reporting | |
| | Part B. Aircraft Operating Matters – Type Related | <ul style="list-style-type: none"> - Limitations, Normal and Abnormal procedures - Technical information and MEL. | |
| | Part C. Route and Aerodrome instructions and information | <ul style="list-style-type: none"> - Aerodrome information: operating minima, navigation aids, communications and charts description | |
| | Part D. Training | Training syllabi and checking programmes | |
| 4.0 Training package | Flight crew should receive appropriate simulator training, briefings and guidance material covering both normal and abnormal procedures. | <ul style="list-style-type: none"> - AMC 20-28 Appendix 4; - CAO Doc 9997; - EASA opinion 05/2013 LOs - ATOs documentation | |
| 5.0 Electronic navigation data management | Navigation database | Navigation data supplied by Type 2 LoA holder | |
| | Quality monitoring | Ensure monitoring of products and process in accordance with quality system required by operational regulations. | |
| | Data distribution | Implement procedures that ensure timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that require it. | |
| | Reportable events | Listed in AMC 20-28 Section 10.4.3 | |

⁹ See Table 1 in Section 5.2

9 MID-TERM EVOLUTION OF EUROPEAN REGULATION ON PBN

European regulation is expected to evolve in the coming years to include certain PBN operations such as LPV approach procedures as standard practices, which will become part of the Instrument Rating license of pilots and standard operators' procedures by default.

These changes are currently reflected in EASA Opinion 03/2015 "Revision of operational approval criteria for performance-based navigation (PBN)" [RD-11]. The document, which was published on the 31st of March 2015, is the result of the Notice of Proposed Amendment NPA 2013-25 [RD-12] released by EASA on the 20th of December 2013 for comments, which were responded on the associated Comments Review Document (CRD) 2015-25.

The Opinion is now addressed to the European Commission, which will use it as a technical basis to prepare proposals to amend the affected Commission Regulations. The Decision containing amendments to the Certification Specification (CS), Acceptable Means of Compliance (AMC) and Guidance Material (GM) will be published by the Agency when the Implementing Rule(s) are adopted by the Commission, which is expected by the second quarter of 2016 with an application date on 25th of August 2016.

Although the transition timelines will be set by the European Commission following a discussion with the Member States, a two years' timeframe has been proposed for the fulfilment of the regulation by the pertinent entities and individual IR license holders.

Figure 9-1 below shows EASA Basic regulation and the Annexes which are impacted by this Opinion which proposes amendments to several existing regulations:

- Air-Crew:
 - CR (EU) No 1178/2011 (Part FCL) and related AMC/GM;
 - CR (EU) No 290/2012 (Part ARA and Part ORA) and related (AMC/GM);

- Air-Ops:
 - CR (EU) No 965/2012 (Annex I – Definitions, Part ARO, Part ORO, Part CAT and Part SPA) and related AMC/GM;
 - Opinion 01/2012 (Part NCC and Part NCO) and related AMC/GM;
 - Opinion 02/2012 (Part SPO) and related AMC/GM;
- PBN related CS-FSTD (A) and (H); and
- PBN Related AMC 20-4, AMC 20-5, AMC 20-12, AMC 20-26, AMC 20-27 and AMC 20-28 (specific for LPVs).

Regarding the specific case of LPV operations, the Opinion proposes to remove the operational material from AMC 20-28 and incorporate it into AMC to the Air OPS Regulation (under the Rule Making Tasks RMT.0256 & RMT.0257) while the airworthiness material will remain in a new document named AMC 20-28A. In fact, the Agency has initiated a progressive migration of all the OPS-related material from AMC 20-XX into AMC/GM to the Air OPS Regulation, while leaving in AMC 20-XX, for the time being, only provisions related to airworthiness. In other words, AMC 20-XX would become a 'horizontal' certification specification applicable to different aircraft categories.

Actually, the Agency is in the process of transferring all RNAV and RNP related airworthiness topics from AMC 20-XX and TGL guidance material into Subpart C of the new Certification Specification - Airborne Communication, Navigation and Surveillance (CS-ACNS). The NPA proposing the amendment to CS-ACNS is expected to be published in 2015.

Regulations Structure

Each Part to each implementing regulation has its own Acceptable Means of Compliance and Guidance Material (AMC/GM). These AMC and GM are amended along with the amendments of the regulations. These AMC/GM are so-called 'soft law' (non-binding rules), and put down in form of EASA Decisions. A comprehensive explanation on AMC in form of questions and answers can be found on the FAQ section of the EASA website.

Furthermore, Certification Specifications are also related to the implementing regulations, respectively their parts. Like AMC/GM they are put down as Decisions and are non-binding.

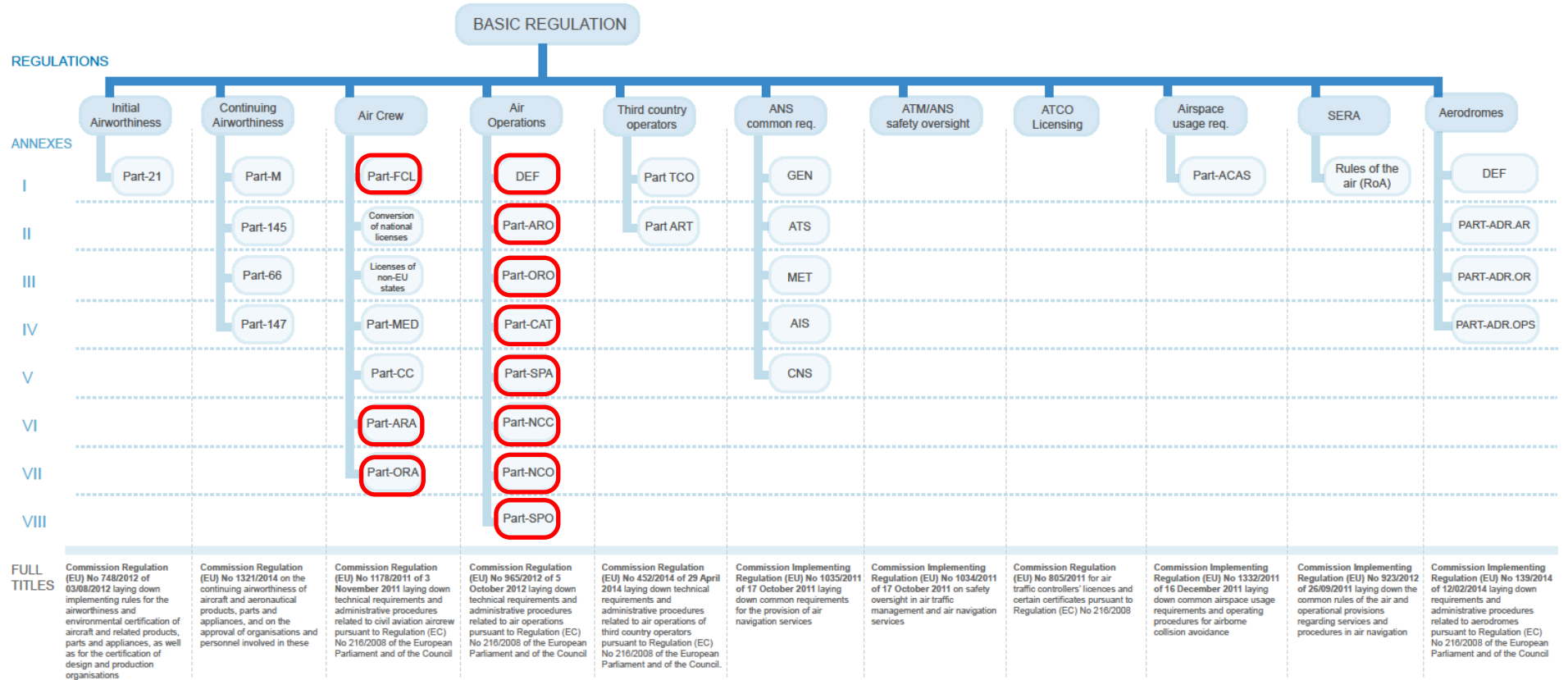


Figure 9-1 EASA regulation Annexes impacted by Opinion 03/2015

The Regulatory Impact Assessment (RIA) carried out at the end of the NPA 2013-25 concluded that removing the obligation for SPA is possible only for a number of selected PBN applications, including LPVs; however, this means that to maintain safety, PBN elements should be included into pilot training and checking for IR.

Furthermore, the RIA recommends transition for already rated pilots, ATO, instructors and examiners based on the periodic cycle of checks, audits or seminars, already established by current rules. Based on this RIA, the following detailed conclusions were reached and proposed in Opinion 03/2015 concerning the SPA for the PBN procedures:

- **SPA are removed** for some PBN types (i.e. RNAV 10, RNAV 5, RNAV 2, RNAV 1, RNP 4, RNP 2, RNP 1 even with RF legs, RNP APCH (LNAV, LNAV/VNAV, LPV and LP) and ADVANCED RNP with RNP scalability, RF legs, FRT, Barometric VNAV and Higher Continuity);
- **Part FCL rules** on training and checking are adapted to reflect the changed requirements in Theoretical Knowledge (TK) and Practical Skills (PS) in order to cover PBN;
- retain the reasonable and required elements in the IR while adding the PBN elements for the **initial qualification of the IR pilots** while keeping the scope similar in duration;
- existing **IR holders** will need to update their TK on PBN while PS shall be demonstrated in courses or on the first periodic check within two years after the application of the new regulation¹⁰;
- **Approved Training Organisations** (ATOs) will comply by 25 August 2016 and notify the competent authority (for CPL, IR and ATPL licenses);

- Flight Instructor (FI) transition will be governed by the existing rules for revalidation;
- examiner transition and competences are assured through the periodical refresher seminar;
- SPA is retained for RNP AR APCH, RNP 0.3 and some cases of Advanced RNP (other than RNP scalability, RF legs, FRT, Barometric VNAV and Higher Continuity), no difference between commercial and non-commercial operators.

The content of this Opinion is being harmonised with a parallel ICAO initiative through the PBNSG and FLTOPSP groups and both should become applicable in 2016. FLTOPSP agreed amendments to all Parts of Annex 6 which will remove the requirement for SPA for the majority of PBN specifications. These amendments, included at the end of Opinion 03/2015, are now being considered by the ICAO ANC, and ICAO Contracting States will be consulted on the matter. After a first review by the ANC, the amendments are expected to be proposed by an ICAO State Letter (type I) in 2015, with possible applicability in November 2016.

The changes introduced in Annex 6 – Part I, Chapter 7.2 Navigation Equipment, are the removal of the need for authorization by the State of Operator of the before mentioned PBN specifications and the inclusion of a new article stating that the operator should:

“have information relevant to the aeroplane navigation specification capabilities listed in the flight manual or other aeroplane documentation, approved by the State of the Design or State of Registry; and have information relevant to the aeroplane navigation specification capabilities included in the MEL.”

In addition,

“the State of the Operator shall, for operations where a navigation specification

¹⁰ According to EC 1178/2011, Subpart G, FCL.625 “IR — Validity, revalidation and renewal From”, an IR shall be valid for 1 year and it shall be revalidated within the 3 months immediately preceding the expiry date of the rating.

for PBN has been prescribed, ensure that the operator has established and documented:

- a. normal and abnormal procedures including contingency procedures;
- b. flight crew qualification and proficiency requirements in accordance with the appropriate navigation specifications;
- c. a training program for relevant personnel consistent with the intended operations; and
- d. appropriate maintenance procedures to ensure continued airworthiness."

The following figure provides an overview of the annexes of the AIR-OPS Regulation and the Commission Regulation which introduced them:

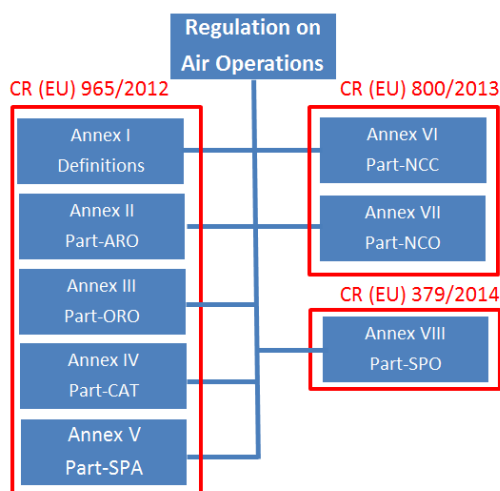


Figure 9-2 Air operations Regulation Annexes

These same ICAO requirements are copied in Annex II of the Opinion as Amendments to Air-Ops in the form of new Part-CAT, NCC, NCO and OP requirements:

- **CAT.OP.MPA.126, NCC.OP.116, NCO.OP.116, SPO.OP.116**

Performance-based navigation

The pilot-in-command shall ensure that, when PBN is required for the route or procedure to be flown:

- a. the relevant PBN navigation specification is stated in the AFM or other document that has been approved by the certifying

authority as part of an airworthiness assessment or is based on such approval; and

- b. the aircraft is operated in conformance with the relevant navigation specification and limitations in the AFM or other document mentioned above.'

- **NCC.OP.145, NCO.OP.135, SPO.OP.140 in Subpart B**

(Operational procedures) is replaced by the following:

- a. Before commencing a flight, the pilot-in-command shall ascertain by every reasonable means available that the space-based facilities, ground and/or water facilities, including communication facilities and navigation aids available and directly required on such flight, for the safe operation of the aircraft, are adequate for the type of operation under which the flight is to be conducted.'

- 5. **NCC.OP.153, NCO.OP.142, SPO.OP.152**

Destination alternate aerodromes – instrument approach procedure relying on GNSS

The pilot-in-command shall only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.'

To summarize, it can be concluded that, **although Opinion 03/2015 will eliminate the need to apply for an SPA for LPV operations** and it will also guarantee that pilots will be properly trained for PBN operations (either by new issued IR licences or after first proficiency check), **the operators will still be required to put the necessary operational procedures in place, amend their operational manuals and other documentation accordingly to obtain the approval from their authorities**, as it happens nowadays with other instrument approach procedures.

APPENDIX A NORMAL AND ABNORMAL OPERATING PROCEDURES

AMC20-28 provides the following standard Operating Procedures (SOPs) which must be developed to cover both normal (pre-flight planning, prior and during procedure) and abnormal (contingency) procedures for the systems used in the LPV operation:

1. Normal Procedures

1.1. Pre-flight Planning

The on board navigation data must be current and must include the appropriate procedures. In addition to the normal pre-flight planning the following checks must be carried out:

- a) The instrument approach chart should clearly identify the LPV approach operation as RNAV(GNSS) to LPV minima. The operator should determine in accordance with the promulgated OCA(H) and the operator operational requirements (e.g. CAT.OP.MPA.110 or NCC.OP.110 and NCO.OP.110 in [RD-3], former EU-OPS 1.430) the Decision Altitude/Height (DA(H)).
- b) The Flight Crew must ensure that LPV approach procedures which may be used for the intended flight (including alternate aerodromes) are selectable from a valid navigation data base (current AIRAC cycle) and are not prohibited by a company instruction or NOTAM.

The Flight Crew could check approach procedures (including alternate aerodromes) as extracted by the system (e.g. CDU flight plan page) or presented graphically on the NAV display, in order to confirm the correct loading and the reasonableness of the procedure content. The vertical path of the LPV approach procedure could be checked as extracted from the navigation database on the system Man Machine Interface (e.g. CDU).

If above verification is not satisfactory, the Flight Crew should not use the procedure, and not consider this(ese) approach(es) during the selection of aerodromes for the intended flight.

Note: For LPV approach operations, the Flight Crew selects the desired approach procedure using its name or the SBAS channel number and the on board system automatically extracts the high-integrity procedure and associated alert limits (VAL, HAL). This information is protected from data corruption by a Cyclic Redundancy Check (CRC) determined during the procedure design.

- c) The Flight Crew should ensure sufficient means are available to navigate and land at the destination or at an alternate aerodrome in the case of loss of the capability to perform RNAV(GNSS) approaches to the published minima.

Note: This is stated in [RD-11] as:

“The operator shall only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.”

- d) Operators and Flight-Crews must take account of any NOTAMs (including SBAS NOTAMs) or operator briefing material that could adversely affect the aircraft system operation, or the availability or suitability of the procedures at the airport of landing, or any alternate airport.

If the missed approach procedure is based on conventional means (e.g. VOR, DME) the appropriate airborne equipment required to fly this procedure must be available and serviceable on board the aircraft. The associated ground-based navigation aids must also be operational.

- e) If the missed approach procedure is based on RNAV (no conventional or dead reckoning missed approach available) the appropriate airborne equipment required to fly this procedure must be available and serviceable on board the aircraft.

- f) Any MEL restriction must be observed.

1.2. Prior to Commencing the Procedure

The Final Approach Segment (FAS) of an LPV approach procedure may be intercepted by an approach transition (e.g. P-RNAV or initial/intermediate segments of an RNP APCH approach) or through vectoring (interception of the extended Final approach segment following ATC instruction).

In addition to normal procedure prior to commencing the approach (before the IAF and in compatibility with crew workload), the Flight Crew must verify the correctness of the loaded procedure by comparison with the appropriate approach charts. This check must include:

- The waypoint sequence;
- Reasonableness of the tracks and distances of the approach legs, and the accuracy of the inbound course and mileage of the final approach segment.

Note: As a minimum, this check could be a simple inspection of a suitable map display.

- The vertical path angle where the system permits.

ATC tactical interventions in the terminal area may include radar headings, 'direct to' clearances which by-pass the initial legs of an approach, interception of an initial or intermediate segment of an approach or the insertion of waypoints loaded from the database. In complying with ATC instructions, the Flight Crew should be aware of the implications for the navigation system in particular:

- the manual entry of coordinates into the navigation system by the Flight Crew for operation within the terminal area is not permitted;
- 'Direct to' clearances may be accepted to the Intermediate Fix (IF) provided that the resulting track change at the IF does not exceed 45°.

Note: Direct to clearance to FAP is not acceptable.

The approach system provides the capability for the Flight Crew to intercept the Final Approach track well before the FAP (Vector To Final (VTF) function or equivalent). This function should be used to respect a given ATC clearance.

ICAO Doc 9997 [RD-7] recommends, in addition, other checks which should be performed prior to commence any PBN Procedure:

- a) it must be confirmed that the correct sensor has been selected and any NAVAID de-selection is complete, if required;
- b) it must be confirmed that a suitable RNP value has been selected, if appropriate, and the navigation performance is adequate for the procedure;
- c) the contingency procedures must be reviewed.

1.3. During the Procedure

The system provides lateral and vertical guidance relative to the LPV Final Approach Segment or to the extended final approach segment (for the direct transition).

The crew must check that the GNSS approach mode indicates LPV (or an equivalent annunciation) prior to passing the FAP.

The final approach segment should be intercepted before the FAP in order for the aircraft to be correctly established on the final approach course before starting the descent (to ensure terrain and obstacle clearance). The appropriate displays should be selected so that the following information can be monitored:

- aircraft position relative to the lateral path;



- aircraft position relative to the vertical path;
- absence of LOI (Loss Of Integrity) alert.

The crew should respect all published altitude and speed constraints.

The Flight Crew shall maintain the aircraft within $\frac{1}{3}$ the full scale deflection for the lateral deviation and within $\frac{1}{2}$ the full scale deflection for the vertical deviation.

Prior to sequencing the FAP, the procedure must be discontinued or may be continued to LNAV minima when supported by the system if there is:

- loss of integrity is indicated by a warning annunciator (e.g. absence of power, equipment failure).

After sequencing the FAP, the procedure must be discontinued, unless the Flight Crew have in sight the visual references required to continue the approach if:

- loss of integrity is indicated by a warning annunciator;
- loss of vertical guidance is indicated (even if lateral guidance is displayed);
- lateral or vertical deviation are excessive and cannot be timely corrected.

The missed approach must be flown in accordance with the published procedure (e.g. conventional or RNAV).

Note: Alternatively, when the aircraft is still above 1 000 ft. AGL, the pilot may decide to continue the approach to LNAV minima when supported by the system.

2. Abnormal Procedures

Abnormal procedures to address Cautions and Warnings resulting from the following conditions should be developed:

- Failure of the navigation system components, including those affecting flight technical errors (e.g. failures of the flight director or autopilot).
- Loss of integrity annunciation.
- Warning flag or equivalent indicator on the lateral and/or vertical navigation display.
- Degradation of the GNSS approach mode during a LPV approach procedure (e.g. downgrade from LPV to LNAV).

In case of a complete RNAV guidance loss during the approach, the crew must follow the operator defined contingency procedure.

In the event of communications failure, the Flight Crew should continue with the procedure in accordance with published lost communication procedures.

The Flight Crew should notify ATC of any problem with the navigation system that results in the loss of the approach capability¹¹.

¹¹ Other reportable events are detailed in 5.3.1

APPENDIX B TRAINING REQUIREMENTS

AMC 20-28 provides the following list of minimum amendment to the Syllabus training programme:

1. RNAV APPROACH CONCEPT CONTAINING LPV MINIMA:

- a) Theory of approach operations;
- b) Approach charting;
- c) Use of the approach system including:
 - i. Selection of the LPV approach procedure;
 - ii. ILS look-alike principle.
- d) Use of lateral navigation mode(s) and associated lateral control techniques;
- e) Use of vertical navigation mode(s) and associated vertical control techniques;
- f) R/T phraseology for LPV approach operations;
- g) The implication for LPV approach operations of systems malfunctions which are not related to the approach system (e.g. hydraulic or engine failure).

2. RNAV APPROACH OPERATION CONTAINING LPV MINIMA:

- a) Definition of LPV approach operations and its direct relationship with RNAV(GNSS) procedures;
- b) Regulatory requirements for LPV approach operations;
- c) Required navigation equipment for LPV approach operations:
 - i. GNSS concepts and characteristics;
 - ii. SBAS augmentation and characteristics;
 - iii. MEL.
- d) Procedure characteristics:
 - i. Chart depiction;
 - ii. Aircraft display depiction;
 - iii. Minima.
- e) Retrieving a LPV approach procedure from the database (e.g. using its name or the SBAS channel number);
- f) Procedure change at destination airport, change arrival airport and alternate airport;
- g) Flying the procedure:
 - i. Use of autopilot, auto-throttle and flight director;
 - ii. Flight Guidance(FG) mode behaviour;
 - iii. Lateral and vertical path management;
 - iv. Adherence to speed and/or altitude constraints;
 - v. Fly interception of an initial or intermediate segment of an approach following ATC notification;
 - vi. Fly interception of the extended final approach segment (e.g. using the VTF function);
 - vii. Consideration of the GNSS approach mode indication (LPV, LNAV/VNAV, LNAV,...);
 - viii. Reversion to LNAV minima;
 - ix. The use of other aircraft equipment to support track monitoring, weather and obstacle avoidance.
- h) ATC procedures;
- i) Abnormal procedures;
- j) Contingency procedures.

In addition, the **PBN Learning Objectives** introduced by Opinion No 03/2015 (NPA 2013/25) are the following¹²:

062 07 00 00 PBN

062 07 01 00 PBN concept (as described in ICAO doc 9613)

062 07 01 01 PBN principles

- List the factors used to define RNAV or RNP system performance requirements (accuracy, integrity, continuity and functionality)
- Explain the concept of continuity
- Explain the concept of integrity
- State that, unlike conventional navigation, performance-based navigation is not sensor specific.
- Explain the difference between raw data and computed data

062 07 01 02 PBN components

- List the components of PBN as NAVAID infrastructure, navigation specification and navigation application
- Identify the components from an example

062 07 01 03 PBN scope

- State that in oceanic/remote, en-route and terminal phases of flight, PBN is limited to operations with linear lateral performance requirements and time constraints
- State that in the approach phases of flight, PBN accommodates both linear and angular laterally guided operations.

062 07 02 00 Navigation Specifications

062 07 02 01 RNAV and RNP

- State the difference between RNAV and RNP in terms of the requirement for on-board performance monitoring and alerting

062 07 02 02 Navigation functional requirements

- List the basic functional requirements of RNAV and RNP specifications (continuous indication of lateral deviation, distance/bearing to active waypoint, g/s or time to active waypoint, navigation data storage and failure indication)

062 07 02 03 Designation of RNP and RNAV specifications

- Interpreting RNAV or RNP as the lateral navigation accuracy (total system error) in nautical miles, which is expected to be achieved at least 95 per cent of the flight time by the population of aircraft operating within the airspace, route or procedure.
- State that aircraft approved to the more stringent accuracy requirements may not necessarily meet some of the functional requirements of the navigation specification having a less stringent accuracy requirement.
- State that RNAV10 and RNP4 are used in the oceanic/remote phase of flight
- State that RNAV5 is used in the enroute and arrival phase of flight
- State that RNAV2 and RNP2 are also used as navigation specifications
- State that RNP2 is used in the enroute, and oceanic/remote phases of flight
- State that RNAV1, RNP1 and RNP 0.313 are used in the arrival and departure phases of flight
- State that RNP APCH is used in the approach phase of flight
- State that RNP AR APCH is used in the approach phase of flight
- State that RNP 0.3 navigation specification is used in all phases of flight except for oceanic/remote and final approach, primarily for helicopters

062 07 03 00 Use of PBN

¹²Some comments received to NPA 2013/25 triggered the insertion of new LOs. These have been added to this list, although the reader is strongly recommended to review the final list of LOs published or referenced by the EU CR once it enters into force for potential updates. For example, a new LO should be added in relation to the “*need to understand the importance to respect the flight director guidance and the speed constraints associated with an RF procedure*” as indicated in comment 154 of CRD_2013/25.

¹³Added as recommendation from comment 37 from CDR 2013/25 (Comment-Response Document to NPA 2013/25).

062 07 03 01 Airspace Planning

- State that navigation performance is one factor used to determine minimum route spacing

062 07 03 02 Approval

- State that the airworthiness approval process assures that each item of the area navigation equipment installed is of a type and design appropriate to its intended function and that the installation functions properly under foreseeable operating conditions
- State that some PBN specifications require operational approval

062 07 03 03 Specific RNAV and RNP system functions

- Recognise the definition of an RF leg
- Recognise the definition of a fixed radius transition
- Recognise the definition of a fly-by turn and a fly-by turn
- Recognise the definition of a holding pattern
- Recognise the definition of an 'ARINC 424 path terminator'
- Recognise the definition of the following path terminators: IF, TF, CF, DF, FA, CA
- Recognise the definition of an offset flight path

062 07 03 04 Data processes

- State that the safety of the application is contingent upon the accuracy, resolution and integrity of the data.
- State that the accuracy of the data depends upon the processes applied during the data origination.

062 07 04 00 PBN operations

062 07 04 01 PBN principles

- Recognise the definition of path definition error
- Recognise the definition of flight technical error
- Recognise the definition of navigation system error
- Recognise the definition of total system error

062 07 04 02 On-board performance monitoring and alerting

- State that on board performance monitoring and alerting of flight technical error is managed by on board systems or crew procedures.
- State that on board performance monitoring and alerting of navigation system error is a requirement of on-board equipment for RNP.
- State that on board performance monitoring and alerting of path definition error are managed by gross reasonableness checks of navigation data.

062 07 04 03 Abnormal situations

- State that abnormal and contingency procedures are to be used in case of the loss of PBN capability.

062 07 04 04 Database management

- State that, unless otherwise specified in operations documentation or AMC, the navigational database must be valid for the current AIRAC cycle.

062 07 05 00 Requirements of specific RNAV and RNP specifications

062 07 05 01 RNAV10

- State that RNAV 10 requires that aircraft operating in oceanic and remote areas be equipped with at least two independent and serviceable LRNSs comprising an INS, an IRS FMS or a GNSS,
- State that aircraft incorporating dual inertial navigation systems (INS) or inertial reference units (IRU) have a standard time limitation
- State that operators may extend their RNAV10 navigation capability time by updating.

062 07 05 02 RNAV5

- State that manual data entry is acceptable for RNAV5

062 07 05 03 RNAV/RNP1/2

- State that pilots must not fly an RNAV/RNP1/2 SID or STAR unless it is retrievable by route name from the on-board navigation database and conforms to the charted route.
- State that the route may subsequently be modified through the insertion (from the database) or deletion of specific waypoints in response to ATC clearances.
- State that the manual entry, or creation of new waypoints by manual entry, of latitude and longitude or place/bearing/distance values is not permitted.

062 07 05 04 RNP4

- State that at least two LRNSs, capable of navigating to RNP 4, and listed in the flight manual, must be operational at the entry point of the RNP airspace

062 07 05 05 RNP APCH

- State that pilots must not fly an RNP APCH unless it is retrievable by procedure name from the on-board navigation database and conforms to the charted procedure.
- State that an RNP APCH to LNAV minima is a non-precision instrument approach procedure designed for 2D approach operations
- State that an RNP APCH to LNAV/VNAV minima has lateral guidance based on GNSS and vertical guidance based on either SBAS or BaroVNAV
- State that an RNP APCH to LNAV/VNAV minima may only be conducted with vertical guidance certified for the purpose
- Explain why an RNP APCH to LNAV/VNAV minima based on BaroVNAV may only be conducted when the aerodrome temperature is within a promulgated range
- State that the correct altimeter setting is critical for the safe conduct of an RNP APCH using BaroVNAV
- State that an RNP APCH to LNAV/VNAV minima is a 3D operation
- State that an RNP APCH to LPV minima is a 3D operation
- State that RNP APCH to LPV minima requires a FAS datablock

062 07 05 06 RNP AR APCH

- State that RNP AR APCH requires authorisation

062 07 05 07 A-RNP

- State that Advanced RNP incorporates the navigation specifications RNAV5, RNAV2, RNAV1, RNP2, RNP1 and RNP APCH
- State that Advanced RNP may be associated with other functional elements

062 07 05 08 PBN Point in Space (PinS) Departure

- State that a PinS departure is a departure procedure designed for helicopter only
- State that a PinS departure procedure includes either a 'proceed VFR' or a 'proceed visually' instruction from landing location to IDF
- Recognise the differences between 'proceed VFR' and 'proceed visually' instruction.

062 07 05 09 PBN Point in Space (PinS) Approach

- State that a PinS approach is an instrument RNP APCH procedure designed for helicopter only and that may be published with LNAV minima or LPV minima
- State that a PinS approach procedure includes either a 'proceed VFR' or a 'proceed visually' instruction from the MAPt to a landing location
- Recognise the differences between 'proceed VFR' and 'proceed visually' instruction.

APPENDIX C REFERENCE DOCUMENTS AND ACRONYMS

Appendix C.1 Reference documentation

- [RD-1] Commission Regulations (EU) No. 1178/2011 (Part FCL)
- [RD-2] Commission Regulations (EU) No. 290/2012 (Part ARA and ORA)
- [RD-3] Commission Regulations (EU) No. 965/2012 (AIR-OPS)
- [RD-4] LPV Implementation Guidelines for Airports and Operators developed by ESSP on behalf of GSA, 31 July 2014
- [RD-5] Performance-Based Navigation (PBN) Manual (Doc 9613). - 4th edition, 2013
- [RD-6] EASA NPA 2015-01 "Performance-Based Navigation (PBN) implementation in the European Air Traffic Management Network (EATMN)" RMT.0639, 19 January 2015
- [RD-7] ICAO PBN Operational Approval Manual, Doc 9997, 2013
- [RD-8] EASA AMC 20-28 - Airworthiness Approval and Operational Criteria for RNAV GNSS approach operation to LPV minima using SBAS
- [RD-9] FAA AC 20-138 Airworthiness Approval of Positioning and Navigation Systems
- [RD-10] FAA AC 90-107 Guidance for Localizer Performance with Vertical Guidance and Localizer Performance without Vertical Guidance Approach Operations in the U.S. National Airspace System
- [RD-11] EASA Opinion 3/2015 Revision of operational approval criteria for Performance-Based Navigation (PBN)
- [RD-12] EASA NPA 2013-25 Revision of operational approval criteria for performance-based navigation
- [RD-13] Commission Regulation (EU) No 245/2014



Appendix C.2 Acronyms

| Acronym | Description | Acronym | Description |
|--------------------|---|---------|---|
| AC | Advisory Circular | ECAC | European Civil Aviation Conference |
| AeMC | Aeromedical Centres | EGNOS | European Geostationary Navigation Overlay Service |
| AFM | Aircraft Flight Manual | EIR | En-route Instrument Rating |
| AGL | Above Ground Level | ESSP | European Satellite Services Provider S.A.S. |
| AIRAC | Aeronautical Information Regulation And Control | ETSOs | European Technical Standard Orders |
| AIR-OPS | Air Operations | EU | European Union |
| AMC | Acceptable Means of Compliance | EWA | EGNOS Working Agreement |
| AML | Applicable Model List | FAA | Federal Aviation Administration |
| ANC | Air Navigation Commission | FAS | Final Approach Segment |
| ANSP | Air Navigation Service Provider | FCL | Flight Crew License |
| AOC | Air Operator Certificate | FD | Flight Display |
| AOM | Aircraft Operations Manual | FFS | Full Flight Simulator |
| APCH | Approach | FG | Flight Guidance |
| APV | Approach with Vertical guidance | FLTOPSP | Flight Operations Panel (ICAO) |
| ARA | Authority Requirements for Aircrew | FMS | Flight Management System |
| ARINC | Aeronautical Radio Inc. | FNPT | Flight and Navigation Procedures Trainer |
| ARO | Authority Requirements for Air Operations | FRT | Fixed Radius Transition |
| ATC | Air Traffic Control | FSTD | Flight Simulation Training Device |
| ATOs | Approved Training Organisations | GA | General Aviation |
| ATPL | Airline Transport Pilot License | GM | Guidance Material |
| ATS | Air Traffic Service | GNSS | Global Navigation Satellite System |
| ATSP | Air Traffic Service Providers | GPS | Global Positioning System |
| CAT | Commercial Air Transport Operations | GSA | European Global Navigation Satellite Systems Agency |
| CBA | Cost Benefit Analysis | HAL | Horizontal Alert Limit |
| CDO | Continuous Descent Operations | IAF | Initial Approach Fix |
| CDU | Control/Display Unit | IAP | Instrument Approach Procedure |
| CFIT | Controlled Flight Into Terrain | ICAO | International Civil Aviation Organization |
| CNS | Communication Navigation and Surveillance | IF | Intermediate Fix |
| CPL | Commercial Pilot Licence | IFR | Instrument Flight Rules |
| CRC | Cyclic Redundancy Check | ILS | Instrument Landing System |
| CRD | Comments Review Document | INS | inertial navigation systems |
| CS | Certification Specification | IR | Instrument Rating |
| | Certification Specification - Airborne | IRU | inertial reference units |
| CS-ACNS | Communication, Navigation and Surveillance | LNAV | Lateral Navigation |
| CS-FSTD (A) (H) | Certification Specifications for Flight Simulation Training Devices (Aircraft/Helicopter) | LO | Learning Objective |
| DA(H) | Decision Altitude/Height | LOA | Letter Of Authorization |
| EASA | European Aviation Safety Agency | LOI | Loss Of Integrity |
| EATMN | European Air Traffic Management Network | LP | Localiser Performance |
| EC | European Commission | LPV | Localiser Performance with Vertical guidance |



EGNOS HOW To obtain RNP APCH operational approval to LPV minima in Europe



European
Global Navigation
Satellite Systems
Agency

| Acronym | Description | Acronym | Description |
|----------|--|---------|----------------------------------|
| MAPt | Missed Approach Point | SOPs | Standard Operating Procedures |
| MCC | Multi Crew Cooperation | SPA | Specific Approval |
| MEL | Minimum Equipment List | SPO | Specialised Operations |
| MMEL | Master Minimum Equipment List | STAR | Standard Instrument Arrival |
| MNPS | Minimum Navigation Performance Specification | STC | Supplemental Type Certificate |
| NAVAID | Navigation Aid | TC | Type certificate |
| NCC | Non-Commercial Operations with Complex Motor-Powered Aircraft | TGL | Temporary Guidance Leaflet |
| NCO | Non-Commercial Operations with Other-Than-Complex Motor-Powered Aircraft | TK | Theoretical Knowledge |
| NDB | Non-Directional Beacon | VAL | Vertical Alert Limit |
| NOTAMs | Notice To Airmen | VFR | Visual Flight Rules |
| NPA | Non Precision Approach | VMC | Visual Meteorological Conditions |
| NPA | Notice of Proposed Amendment | VOR | VHF Omnidirectional Range |
| NSA | National Supervisory Authority | VNAV | Vertical Navigation |
| OCA(H) | Obstacle Clearance Altitude (Height) | VTF | Vector To Final |
| OEM | Original Equipment Manufacturer | WAAS | Wide Area Augmentation System |
| OM | Operations Manual | | |
| ORA | Authorities and Organizations Approvals | | |
| ORO | Organisation Requirements for Air Operations | | |
| PANS OPS | Procedures for Air Navigation Services – Aircraft Operations | | |
| PBN | Performance Based Navigation | | |
| PBNSG | PBN Subgroup (ICAO) | | |
| PinS | Point in Space | | |
| POH | Pilot's Operating Handbook | | |
| PTO | Pilot Training Organisation | | |
| PS | Practical Skills | | |
| RF | Radios to Fix | | |
| RIA | Regulatory Impact Assessment | | |
| RMT | Rule Making Tasks | | |
| RNAV | Area Navigation | | |
| RNP | Required Navigation Performance | | |
| RTCA | Radio Technical Commission for Aeronautics | | |
| RTF | Radiotelephony | | |
| RVSM | Reduced Vertical Separation Minima | | |
| RWY | Runway | | |
| SB | Service Bulletin | | |
| SBAS | Satellite Based Augmentation System | | |
| SDD | Service Definition Document | | |
| SES | Single European Sky | | |
| SID | Standard Instrument Departure | | |
| SoL | Safety of Life | | |