

Notice of Requirement NTC 91.263

RNP APCH (LP and LPV) Navigation Specification

Revision 1

Preliminary

The Director of Civil Aviation issues the following requirements (“the requirements”), conditions and restrictions relating to the use of the RNP APCH (LP and LPV) Navigation Specification under section 28(5) of the Civil Aviation Act 1990 and Civil Aviation Rule 91.263(1).

Purpose

The purpose of this notice is to specify the requirements for RNP APCH operation down to LP or LPV minima, determined by the Director under rule 91.263, regarding:

- i. the application of the RNP APCH operations down to LP or LPV minima;
- ii. the navigation functionalities the aircraft systems must have;
- iii. requirements for system redundancy, including requirements for conventional navigation equipment
- iv. continuing airworthiness requirements;
- v. operator procedures;
- vi. the operational and training requirements placed on flight crew members; and

- vii. approval by the Director for the RNP APCH operations down to LP or LPV minima.

Rule 91.263(b) requires compliance with the requirements in this notice to ensure the safe operation of aircraft using RNP APCH procedures down to LP or LPV minima.

General

Civil Aviation Authority (CAA) Notices contain approvals and requirements including the detail about the approvals, standards, conditions, procedures and technical specifications that have been approved or determined by the Director under the Civil Aviation Rules. These details must be complied with by parties to whom it applies. They apply in particular circumstances to particular aviation document holders as specified in the notice.

CAA notices are issued under Civil Aviation Rules in accordance with section 28(5) of the Civil Aviation Act. This section permits the Minister of Transport to make ordinary rules, and to specify any terms and conditions within the rules:

- to require a matter to be determined, or undertaken or approved by the Authority, the Director or another person; or
- to empower the Authority, Director, or another person to impose requirements or conditions as to the performance of any activity, including (but not limited to) any procedures to be followed.

Notices support a performance-based approach to regulation and improve the flexibility and responsiveness of the Civil Aviation Rules. They may be used where performance-based regulation is the appropriate way to achieve the desired regulatory outcome, for example, in circumstances where new technological changes or challenges require more flexibility than prescribing requirements in the rules (and rulemaking may get quickly out-dated), or where there is a need to respond to safety issues which the rules do not adequately deal with.

The requirements stated in this notice are mandatory and must be complied with.

Related Rules

Civil Aviation Rules 91.261, 91.263, 91.263B and 91.263C

Effective Date

This notice comes into effect on 21 December 2022.

Issue of CAA Notice



21/12/2022

Signed by
Director of Civil Aviation

Date

Revision History

Revision 1	Original version
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RNP APCH (LP and LPV) Navigation Specification



1. Application

- (a) These requirements apply to:
 - (1) every operator of an aircraft operating under instrument flight rules using a RNP APCH navigational procedure down to LP or LPV minima (RNP APCH (LP and LPV) operations);
 - (2) every operation of GNSS based approaches that give access to minima classified as LP or LPV; and
 - (3) every operation along the final approach straight segment and the straight continuation of the final approach in the missed approach.
- (b) The RNP APCH (LP and LPV) specification is based on augmented GNSS to support RNP APCH operations down to LP or LPV minima.
- (c) These requirements do not apply to curved approaches.

2. Operational Approval Requirements

- (a) Description of aircraft equipment:
 - (1) The operator must ensure that relevant documentation acceptable to the Director is available to establish that the aircraft is equipped with an RNP system with a demonstrated RNP APCH (LP or LPV) capability.
 - (2) The operator must have a configuration list and, if necessary, a MEL detailing the required aircraft equipment for RNP APCH operations down to LP or LPV minima.
- (b) Training documentation:
 - (1) An air operator certificated under Part 119 must have a training programme addressing the operational practices, procedures and training items related to RNP APCH operations down to LP or LPV minima.

- (2) A private operator under Part 91 must be familiar with the practices and procedures referred to in clause 5 of this notice.
- (c) Operations manuals and checklists:
 - (1) An air operator certificated under Part 119 must ensure that its operations manuals and checklists address the operational procedures referred to in clause 4 of this notice.
 - (2) The operator must ensure that appropriate manuals must contain navigation operating instructions, and contingency procedures where specified.
 - (3) The operator must submit their manuals and checklists to the Director for review as part of the application process.
- (d) MEL considerations:
 - (1) The operator must adjust the MEL, or equivalent, to allow for RNP APCH operations down to LP or LPV minima and specify the required dispatch conditions.
 - (2) Any MEL revisions necessary to address RNP APCH operations down to LP or LPV minima must be approved by the Director.
- (e) Continuing airworthiness:

The operator must -

- (1) submit to the Director the continuing airworthiness instructions applicable to the aircraft's configuration and the aircraft's qualification for RNP APCH operations down to LP or LPV minima; and
- (2) submit to the Director their maintenance programme, including a reliability programme for monitoring the equipment.

3. Aircraft Requirements

- (a) The operator must ensure that the following requirements regarding on-board performance monitoring and alerting are met:

(1) Accuracy:

Along the FAS and the straight continuation of the final approach in the missed approach, the lateral and vertical TSE is dependent on the NSE, PDE and FTE:

- (i) NSE requirements are fulfilled if the equipment computes 3-dimensional positions using linearised, weighted least square solution in accordance with RTCA DO 229C Appendix J or amendments, or an equivalent standard acceptable to the Director;
- (ii) FTE performance is acceptable if the lateral and vertical display full-scale deflection is compliant with the non-numeric lateral cross-track and vertical deviation requirements of RTCA DO 229 C or amendments, or equivalent standard acceptable to the Director, and if the pilots maintain the aircraft within one-third the full scale deflection for the lateral deviation and within one-half the full scale deflection for the vertical deviation;
- (iii) PDE is negligible based upon the process of path specification to data specification and associated quality assurance that is included in the FAS data-block generation process.

(2) Integrity:

- (i) Simultaneously presenting misleading lateral and vertical guidance with misleading distance data during an RNP APCH operation down to LPV minima is a hazardous failure condition under the airworthiness requirements of 1×10^{-7} per hour.
- (ii) Simultaneously presenting misleading lateral guidance with misleading distance data during an RNP APCH operation down to LP minima is a hazardous failure condition under the airworthiness requirements of 1×10^{-7} per hour.

(3) Continuity:

Loss of function is a minor failure condition if the operator can revert to a different navigation system and proceed to a suitable airport.

(4) On-board performance and monitoring:

Operations on the FAS of an RNP APCH operation down to LP and LPV minima, the on-board performance monitoring and alerting function is fulfilled by:

- (i) NSE monitoring and alerting; and
- (ii) FTE monitoring and alerting: LPV approach guidance must be displayed on a lateral and vertical deviation display (HSI, EHSI, CDI/VDI) including a failure indicator. The deviation display must have a suitable full-scale deflection based on the required track-keeping accuracy. The lateral and vertical full scale deflection are angular and associated to the lateral and vertical definitions of the FAS contained; and
- (iii) Navigation database: once the FAS DB has been decoded, the equipment is to apply the CRC to the DB to determine whether the data is valid. If the FAS DB does not pass the CRC test, the equipment must not allow activation of the LP or LPV approach operation.

(5) Signal-In-Space:

- (i) At a position between 2 NM from the FAP and the FAP, the aircraft navigation equipment must provide an alert within 10 seconds if the SIS errors causing a lateral position error are greater than 0.6 NM, with a probability of 1×10^{-7} per hour.
- (ii) After sequencing the FAP and during operations on the FAS of an RNP APCH operation down to LP or LPV minima -
 - (A) the aircraft navigation equipment must provide an alert within 6 seconds if the

SIS errors causing a lateral position error are greater than 40 m, with a probability of $1-2 \times 10^{-7}$ in any approach; and

- (B) the aircraft navigation equipment must provide an alert within 6 seconds if the SIS errors causing a vertical position error is greater than 50 m (or 35 m for LPV minima down to 200 ft), with a probability of $1-2 \times 10^{-7}$.

- (b) Criteria for specific navigation systems:

Positioning data from other types of navigation sensors, other than augmented GNSS, may be integrated with the GNSS data provided the other positioning data do not cause position errors exceeding the TSE budget. Otherwise, means are to be provided to deselect the other navigation sensor types.

- (c) The operator must ensure that the following functional requirements are met:

The following navigation displays and functions are required:

- (1) Approach guidance must be displayed on a lateral and vertical deviation display (HSI, EHSI, CDI/VDI) including a failure indicator and must meet the following requirements -
- (i) this display must be used as primary flight instruments for the approach;
 - (ii) the display must be visible to the pilot and located in the primary field of view within ± 15 degrees from the pilot's normal line of sight when looking forward along the flight path; and
 - (iii) the deviation display must have a suitable full-scale deflection based on the required track-keeping accuracy.
- (2) The lateral and vertical full-scale deflection are angular and associated to the lateral and vertical definitions of the FAS contained in the FAS DB.

The following system functions are required:

- (3) The capability to display the GNSS approach mode such as LP, LPV, LNAV/VNAV and lateral navigation in the primary field of view.
- (4) The capability to continuously display the distance to the LTP/FTP.
- (5) The navigation database must contain all the necessary data/information to fly the published approach procedure. Although data may be stored or transmitted in different ways, the data has to be organised in DBs for the purpose of computing the CRC.
- (6) The capacity to select from the database into the installed system the whole approach procedure to be flown.
- (7) The indication of the loss of navigation such as system failure in the pilot's primary field of view by means of a navigation warning flag or equivalent indicator on the vertical and/or lateral navigation display.
- (8) The indication of the LOI function in the pilot's normal field of view.
- (9) The capability to immediately provide track deviation indications relative to the extended FAS, in order to facilitate the interception of the extended FAS from a radar vector, such as VTF function.

4. Operating Procedures

- (a) Pre-flight planning:
 - (1) The operator must ensure that the on-board navigation data is current and include appropriate procedures.
 - (2) The pilot must ensure sufficient means are available to navigate and land at the destination or at an alternate aerodrome in the case of loss of LP or LPV airborne capability.

- (3) The pilot must ensure that the availability of the NAVAID infrastructure, required for the intended procedures, including any non-RNAV missed approach procedures or contingencies, must be confirmed for the period of intended operations using all available information.
 - (4) The pilot must confirm if GNSS integrity (SBAS signal) as being available as appropriate.
- (b) Augmented GNSS availability (SBAS):
- (1) RNP APCH capability down to LP or LPV minima depends on the availability of SBAS service, therefore if there is a predicted, continuous loss of appropriate level of fault detection of more than 5 minutes for any part of the RNP APCH operation, the pilot must revise the flight planning.
 - (2) Pilots must assess the RNP APCH capability to navigate potentially to an alternate destination if the GPS and SBAS navigation fails
- (c) General operating procedures:
- (1) The pilot must comply with any instructions or procedures identified by the manufacturer as necessary to comply with the performance requirements in this navigation specification.
 - (2) If an aircraft that does not meet the requirements of this notice receives a clearance from ATC to conduct an RNP APCH procedure down to LP or LPV minima, the pilot-in-command must advise ATC that he or she is unable to accept the clearance and must request alternate instructions.
 - (3) The pilot may use flight director and/or autopilot in lateral navigation mode if available.
 - (4) If the missed approach is based on conventional means such as NDB, VOR or DME, operator must ensure that the required navigation equipment is installed and be operable to fly the RNP APCH procedure.

- (d) Pilot requirements specific to certain phases of flight:
- (1) RNP APCH (LP and LPV) specific requirements before commencing the procedure:
 - (i) In addition to the normal procedure before commencing the approach, the pilot must verify the correct procedure was loaded by comparison with the approach charts, which includes checking -
 - (A) the waypoint sequence; and
 - (B) reasonableness of the tracks and distances of the approach legs, and the accuracy of the inbound course and length of the FAS; and
 - (C) the vertical path angle;
 - (ii) when complying with ATC instructions, the pilot must be aware of the implications for the RNP system;
 - (iii) the pilot must not manually enter the coordinates into the RNP system for operation within the terminal area;
 - (iv) “direct to” clearances may be accepted to the IF provided that the resulting track change at the IF does not exceed 45 degrees; “Direct to” clearance to the FAF is not acceptable; and
 - (v) the approach system provides the capability for the pilot to intercept the final approach track before the FAP (VTF function or equivalent).
 - (2) RNP APCH (LP and LPV) specific requirements during the procedure:
 - (i) The approach mode must be activated automatically by the RNP system. When a direct transition to the approach procedure is conducted, the LP or LPV approach mode is immediately activated.

- (ii) The pilot must check that the GNSS approach mode indicates LP or LPV or an equivalent annunciation 2 NM before the FAP.
- (iii) The FAS is to 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.
- (iv) The appropriate display must be selected so that the following information can be monitored:
 - (A) aircraft position relative to the lateral path;
 - (B) aircraft position relative to the vertical path; and
 - (C) absence of LOI alert.
- (v) Before sequencing the FAP, the pilot must abort the approach procedure if there is:
 - (A) loss of navigation indicated by a warning flag;
 - (B) LOI monitoring, annunciated locally, or equivalent; or
 - (C) low altitude alert if applicable.
- (vi) After sequencing the FAP, unless the pilot has the visual references required to continue the approach in sight, the procedure must be discontinued if:
 - (A) loss of navigation is indicated by a warning flag;
 - (B) loss of vertical guidance is indicated (even if lateral guidance is already displayed); and/or
 - (C) FTE is excessive and cannot be corrected

in a timely manner.

- (vii) Pilots must execute a missed approach if excessive lateral and/or vertical deviations are encountered and cannot be corrected on time, unless the pilot has in sight the visual references required to continue the approach.
- (viii) The missed approach must be flown in accordance with the published procedure.

5. Pilot knowledge and training

- (a) Operators must ensure that pilots are trained and have appropriate knowledge of the topics specific to RNP APCH operations down to LP or LPV minima as contained in AC91-21, and AC61-17, if applicable.
- (b) Pilots must be appropriately licensed, rated and endorsed on the specific equipment to be used for RNP APCH operations down to LP or LPV minima, including knowledge of specific organisational standard operating procedures.

6. Navigation database

- (a) The operator must not use a navigation database for these approach operations unless the navigation database supplier holds a type 2 LOA or an equivalent standard acceptable to the Director.
- (b) If used, the operator must ensure that the navigation database complies with RTCA DO 200A/EUROCAE document ED 76, Standards for Processing Aeronautical Data or an equivalent standard acceptable to the Director.
- (c) The operator must –
 - (1) report any discrepancies that invalidate an approach procedure to the navigation database supplier;
 - (2) inform the pilots of the discrepancies;
 - (3) prohibit the pilots from using the affected procedures; and

- (4) conduct periodic checks of the operational navigation databases to ensure that existing quality system requirements are met.

7. Operator to comply with requirements, Part 119 operator be certificated and approved by Director for RNP APCH (LP and LPV) operations

An operator must not carry out RNP APCH operations down to LP or LPV minima unless –

- (1) the operator complies with all the applicable requirements of this notice; and
- (2) for operations conducted under Part 119, the operator is certificated and approved by the Director to conduct the RNP APCH operations down to LP or LPV minima.