

Notice of Requirement NTC 91.263

RNP APCH (LNAV and LNAV/VNAV) 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 (LNAV and LNAV/VNAV) 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 LNAV or LNAV/VNAV minima, determined by the Director under rule 91.263, regarding:

- i. the application of the RNP APCH operations down to LNAV or LNAV/VNAV 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 LNAV or LNAV/VNAV 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 LNAV or LNAV/VNAV 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 (LNAV and LNAV/VNAV) 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 LNAV or LNAV/VNAV minima (RNP APCH (LNAV and LNAV/VNAV) operations);
 - (2) every operation of GNSS-based approaches that gives access to minima classified as LNAV or LNAV/VNAV;
 - (3) every operation in the initial, intermediate segments and the missed approach of a RNP APCH that requires a lateral navigation accuracy (TSE) of 1 nautical mile, to be achieved at least 95 % of the flight time;
 - (4) every operation on the final approach segments (FAS) of an RNP APCH down to LNAV or LNAV/VNAV minima that requires lateral navigation accuracy (TSE) of 0.3 nautical mile, to be achieved at least 95 % of the flight time;
 - (5) the lateral part of the navigation system, if the system is to be approved for approach procedures with vertical guidance down to VNAV minima, the system must be compliant with the requirements outlined in the PBN specification notice Baro-VNAV and/or PBN specification notice RNP APCH (LP and LPV); and
 - (6) straight-in approaches only.
- (b) These requirements do not apply to any operation on curved approach segments which require RNP APCH AR.

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 (LNAV or LNAV/VNAV) capability.

- (2) The operator must have a configuration list and, if necessary, an MEL detailing the required aircraft equipment for RNP APCH operations down to LNAV or LNAV/VNAV 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 LNAV or LNAV/VNAV 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 the appropriate manuals contain navigation operating instructions and contingency procedures.
 - (3) The operator must submit their manuals and checklists to the Director for review as part of the application process.
- (d) MEL considerations:
 - (1) Operators must adjust the MEL, or equivalent, to allow for RNP APCH operations down to LNAV or LNAV/VNAV minima and specify the required dispatch conditions.
 - (2) Operators must ensure that any MEL revisions necessary to address RNP APCH operations down to LNAV or LNAV/VNAV minima is 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 LNAV or LNAV/VNAV 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:
 - (i) During operations on the initial and intermediate segments and the missed approach of an RNP APCH –
 - (A) the lateral TSE must be within ± 1 NM for at least 95% of the total flight time; and
 - (B) the along track error must also be within ± 1 NM for at least 95 % of the total flight time; and
 - (C) to satisfy the accuracy requirement, the 95 % FTE must not exceed 0.5 NM.
- (b) The operator must ensure that during operation on the FAS of an RNP APCH down to LNAV or LNAV/VNAV minima, the following requirements are met -
 - (1) the lateral TSE must be within ± 0.3 NM for at least 95% of the total flight time; and
 - (2) the along track error must also be within ± 0.3 NM for at least 95 % of the total flight time; and
 - (3) to satisfy the accuracy requirement, the 95 % FTE must not exceed 0.25 NM.
- (c) The operator must ensure that the following integrity requirement is met:

The aircraft navigation equipment must be designed and installed to ensure that the probability of a major failure condition such as the malfunction of the equipment occurring is less than 1×10^{-5} per hour.

(d) Continuity:

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

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

(1) During operations on the initial and intermediate segments, and the missed approach of an RNP APCH, the RNP system, or the RNP system and pilot in combination, must provide an alert if the accuracy requirement is not met, or if the probability that the lateral TSE exceeds 2 NM is greater than 1×10^{-5} .

(2) During operations on the FAS of an RNP APACH down to LNAV or LNAV/VNAV minima, the RNP system, or the RNP system and pilot in combination, must provide an alert if the accuracy requirement is not met, or if the probability that the lateral TSE exceeds 0.6 NM is greater than 1×10^{-5} .

(f) The operator must ensure that the following requirements regarding Signal-In-Space are met:

(1) During operations on the initial and intermediate segments, and the missed approach of an RNP APCH, the aircraft navigation equipment must provide an alert if the probability of SIS errors causing a lateral position error greater than 2 NM exceeds 1×10^{-7} per hour.

(2) During operations on the FAS of an RNP APACH down to LNAV or LNAV/VNAV minima, the aircraft navigation equipment must provide an alert if the probability of SIS errors causing a lateral position error greater than 0.6 NM exceeds 1×10^{-7} per hour.

(g) Requirement for specific navigation systems:

The operator must ensure that positioning data from other types of navigation sensors, other than 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.

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

The following navigation displays and functions installed per FAA Advisory Circular AC 20-130A and AC 20-138A or equivalent airworthiness installation standards acceptable to the Director are required:

- (1) Navigation data, including a failure indicator, must be displayed on a lateral deviation display (CDI, EHSI) and/or a navigation map display and must be used as primary flight instruments for the navigation of the aircraft, for manoeuvre anticipation and for failure/status/integrity indication:
 - (i) the displays 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;
 - (ii) the lateral deviation display scaling is to align with any alerting and annunciation limits;
 - (iii) the lateral deviation display must have a full-scale deflection suitable for the current phase of flight and must be based on the TSE requirement. Scaling is ± 1 NM for the initial and intermediate segments and ± 0.3 NM for the final segment;
 - (iv) the display scaling may be set automatically by default logic or set to a value obtained from a navigation database;
 - (v) the full-scale deflection value must be known or must be available for display to the pilot commensurate with approach values;
 - (vi) as an alternate means, a navigation map display must give equivalent functionality to a lateral deviation display with appropriate map scales and

scaling may be set manually by the pilot. The navigation map display must be shown to meet the TSE requirements;

- (vii) the course selector of the deviation display is to be automatically slaved to the RNAV computed path;
 - (viii) If the lateral TSE cannot be demonstrated without these systems, a flight director and/or autopilot is required for an operation. Coupling to the flight director and/or automatic pilot from the RNP system must be clearly indicated at the cockpit level; and
 - (ix) enhanced navigation display such as electronic map display or enhanced EHSI to improve lateral situational awareness, navigation monitoring and approach verification (flight plan verification) may be required if the RNAV installation doesn't support the display of information necessary to complete these crew tasks.
- (2) The following system functions are required as a minimum:
- (i) the capability to continuously display to the pilot flying, on the primary flight instruments for navigation of the aircraft (primary navigation display), the RNAV computed desired path and aircraft position relative to the path;
 - (ii) for aircraft where the minimum flight crew members are 2 pilots, the means for the pilot not flying to verify the desired path and the aircraft position relative to the path must also be provided;
 - (iii) a navigation database, containing current navigation data officially promulgated for civil aviation, which can be updated in accordance with the AIRAC cycle and from which approach procedures can be retrieved and loaded into the RNP system;
 - (iv) the stored resolution of the data must be sufficient to achieve the required track-keeping accuracy. The database must be protected against pilot modification of the stored data;
 - (v) the means to display the validity period of the navigation data to the pilot;

- (vi) the means to retrieve and display data stored in the navigation database relating to individual waypoints and NAVAIDs, to enable the pilot to verify the procedure to be flown;
 - (vii) the capacity to load from the database into the RNP system the whole approach to be flown. The approach must be loaded from the database, into the RNP system, by its name.
- (3) The means to display the following items, either in the pilot's primary field of view, or on a readily accessible display page-
- (i) the identification of the active (To) waypoint;
 - (ii) the ground speed or time to the active (To) waypoint; and
 - (iii) the distance and bearing to the active (To) waypoint.
- (4) The means to display the following items on a readily accessible display page-
- (i) the display of distance between flight plan waypoints;
 - (ii) the display of distance to go;
 - (iii) the display of along-track distances; and
 - (iv) the active navigation sensor type, if there is another sensor in addition to the GNSS sensor.
- (5) The capability to execute a "direct to" function.
- (6) The capability for automatic leg sequencing with the display of sequencing to the pilot.
- (7) The capability to execute procedures extracted from the on-board database, including the capability to execute fly-over and fly-by turns.
- (8) The aircraft must have the capability to automatically execute leg transitions and maintain tracks consistent with the following ARINC 424 path terminators, or their equivalent:

- (i) IF;
 - (ii) CF;
 - (iii) DF;
 - (iv) TF.
- (9) The capability to display an indication of the RNP system failure, in the pilot's primary field of view.
 - (10) The capability to indicate to the crew members when NSE alert limit is exceeded.
 - (11) The capability to automatically load numeric values for courses and tracks from the RNP system database.

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 operator must confirm the availability of the NAVAID infrastructure required for the intended procedures, including any non-RNAV missed approach procedures or contingencies, for the period of intended operations using all available information.
 - (3) The operator must ensure that the availability of GNSS integrity such as RAIM of SBAS signal is determined as appropriate.
 - (4) For aircraft navigating with SBAS receivers, operators must check appropriate GPS RAIM availability in areas where the SBAS signal is unavailable.
- (b) ABAS availability:
 - (1) Operators relying on GNSS must have the means to predict the availability of GNSS fault detection such as ABAS RAIM to support operations along the RNP APCH procedure.

- (2) In the event of a predicted, continuous loss of appropriate level of fault detection of more than 5 minutes for any part of the RNP APCH operation, the operator must revise the flight planning as appropriate.
- (c) Augmented GNSS availability (SBAS):

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) Operators and pilots must not request or file RNP APCH procedures down to LNAV or LNAV/VNAV minima unless they satisfy the requirements of this notice.
- (3) If an aircraft not meeting the requirements of this notice receives a clearance from ATC to conduct an RNP APCH procedure down to LNAV or LNAV/VNAV minima, the pilot-in-command must advise ATC that he or she cannot accept the clearance and must request alternate instructions.
- (4) The pilot is encouraged to use flight director and/or autopilot in lateral navigation mode if available.
- (5) If the missed approach is based on conventional means such as NDB, VOR or DME, the required navigation equipment must be installed and be serviceable to fly the RNP APCH procedure.
- (6) Pilot requirements specific to certain phases of flight:

RNP APCH (LNAV and LNAV/VNAV) 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 comparing with the approach cards.
- (ii) The check referred to in paragraph (i) must include:

- (A) the waypoint sequence;
 - (B) reasonableness of the tracks and distances of the approach legs; and
 - (C) the accuracy of the inbound course and length of the FAS.
- (iii) The pilot must check using the published charts, the map display or CDU, which waypoints are fly-by and which are fly-over.
 - (iv) For an RNP system with ABAS requiring barometric corrected altitude, the current airport barometric altimeter setting must be input at the appropriate time and location, consistent with the performance of the flight operation.
 - (v) When the operation is predicated on the availability of ABAS, the pilot must perform a new RAIM availability check if ETA is more than 15 minutes different from the ETA used during the pre-flight planning.
 - (vi) When complying with ATC instructions the pilot -
 - (A) must not manually enter coordinates into the RNP system for operation within the terminal area;
 - (B) may accept “direct to” clearances to the IF provided that the resulting track change at the IF does not exceed 45 degrees; and
 - (C) must not accept “Direct to” clearance to the FAF.
 - (vii) The pilot must not revise the lateral definition of the flight path between the FAF and the MAP.
- (7) RNP APCH (LNAV and LNAV/VNAV) specific requirements during the procedure:

- (i) For multi-sensor system the pilot must verify that the GNSS sensor is used for position computation.
- (ii) The aircraft must be established on the final approach course not later than the FAF before starting the descent.
- (iii) The flight crew members must check the approach mode annunciator or equivalent, is properly indicating approach mode integrity within 2 NM before the FAF.
- (iv) The appropriate displays must be selected so that the following information can be monitored -
 - (A) the RNAV-computed desired path; and
 - (B) the aircraft position relative to the path (cross-track deviation) for FTE monitoring.
- (v) The procedure must be discontinued -
 - (A) if the navigation display is flagged invalid; or
 - (B) in case of LOI alerting function; or
 - (C) if integrity alerting function is annunciated not available before passing the FAF; or
 - (D) if FTE is excessive.
- (vi) Except as provided in paragraph (vii), the missed approach must be flown in accordance with the published procedure.
- (vii) Despite paragraph (vi), use of the RNP system during the missed approach is acceptable if -
 - (A) the RNP system is operational; and

- (B) the whole procedure including the missed approach, is loaded from the navigation database.
- (viii) During the RNP APCH procedure, pilots must use a lateral deviation indicator, flight director and/or autopilot in lateral navigation mode. Pilots of aircraft with a lateral deviation indicator such as CDI must ensure that lateral deviation indicator scaling (full-scale deflection) is suitable for the navigation accuracy associated with the various segments of the procedure (i.e. ± 1.0 NM for the initial and intermediate segments, ± 0.3 NM for the FAS down to LNAV or LNAV/VNAV minima, and ± 1.0 NM for the missed approach segment).
- (ix) When Barometric VNAV is used for vertical path guidance during the FAS, deviations above and below the Barometric VNAV path must not exceed ± 75 ft.
- (x) Pilots must execute a missed approach if the lateral deviations or vertical deviations, if provided, exceed the criteria above, unless the pilot has in sight the visual references required to continue the approach.

5. Pilot knowledge and training

- (a) Pilots must be trained and have appropriate knowledge of the topics specific to RNP APCH operations down to LNAV or LNAV/VNAV minima as contained in AC 91-21, and AC61-17 if applicable, including the limits of their navigation capabilities, the effects of updating, and contingency procedures where specified.
- (b) Pilots must be appropriately licensed, rated and endorsed on the RNP APCH operations down to LNAV or LNAV/VNAV minima, including knowledge of specific organisational standard operating procedures, if applicable.

6. Navigation database

- (a) 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.

- (b) The operator must –
 - (1) report any discrepancies that invalidate an approach procedure to the navigation database supplier;
 - (2) inform the pilots of the discrepancies; and
 - (3) prohibit the pilots from using the affected approach procedure; and
 - (4) conduct periodic checks of the operational navigation databases to ensure that existing quality system requirements are met.

7. Approvals for carrying out RNP APCH (LNAV and LNAV/VNAV) operations

- (a) An operator must not carry out RNP APCH operations down to LNAV or LNAV/VNAV 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 has been approved by the Director to conduct the RNP APCH operations down to LNAV or LNAV/VNAV minima.
- (b) An approval granted by the Director for RNAV (GNSS) approach operations that existed immediately before 21 December 2022 is deemed to be an approval by the Director to carry out RNP APCH to LNAV minima under paragraph (a)(2), if the pilot meets all the applicable requirements of this notice.