CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

Notice of Requirement

NTC 91.263

RNP1 Navigation Specification

Revision 1
Click to select a revision date.

Preliminary

The Director of Civil Aviation issues the following requirements ("the requirements"), conditions and restrictions relating to the use of the RNP1 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 RNP1 operations, determined by the Director under rule 91.263, regarding:

i. The application of the RNP1 operations;

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 RNP1 operations.

Rule 91.263(b) requires compliance with the requirements in this Notice to ensure the safe operation of aircraft using RNP1 procedures.

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, 91.263D, 91.263F

Effective Date

This notice comes into effect on [date that the new rules come into force].

Issue of CAA Notice

Signed by
Director of Civil Aviation

Date

Revision History

Revision 1	Original version

RNP1 Navigation Specification

1. Application

These requirements apply to:

(a) every operator of an aircraft operation carried out under instrument flight rules using a RNP1 navigational procedure or route (RNP1 operations); and

(b) every operation connecting the en-route structure and terminal airspace with little or no ATS surveillance, with low to medium density traffic; and

(c) every operation that requires a lateral navigation accuracy (TSE) of 1 nautical mile, which is expected to be achieved at least 95 % of the flight time by the population of aircraft operating within the airspace, route or procedure.

2. Operational Approval Requirements

(a) Description of aircraft equipment:

The operator must have a configuration list and, if necessary, an MEL detailing the required aircraft equipment for RNP 1 operations.

(b) Training documentation:

(1) A commercial operator certificated under Part 119 or 129 must have a training programme addressing the operational practices, procedures and training items related to RNP 1 operations (e.g. initial, upgrade or recurrent training for pilots, dispatchers or maintenance personnel).

(2) A private operator under Part 91 must be familiar with the practices and procedures referred to in section 4 of this notice.

(c) Operations Manuals and checklists:

(1) Operations Manuals (OMs) and checklists for a certificate holder under Part 119 or 129 must address information or guidance on operational procedures referred to in section 4 of this notice.

(2) The appropriate manuals should 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) Operators must adjust the MEL, or equivalent, to allow for RNP1 operations, and specify the required dispatch conditions.

(2) Any MEL revisions necessary to address RNP 1 operations 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 RNP1 navigation procedure or route; and

(2) submit to the Director their maintenance programme, including a reliability programme for monitoring the equipment.

3. Aircraft Requirements

(a) On-board Performance Monitoring and Alerting:

(1) Accuracy:

During operations in airspace or on routes designated as RNP 1 –

(i) the lateral TSE must be within ±1 NM for at least 95% of the total flight time;

(ii) the along-track error must also be within ±1 NM for at least 95 % of the total flight time; and

(iii) to satisfy the accuracy requirement, the 95 % FTE should not exceed 0.5 NM.

(2) Integrity:

Malfunction of the aircraft navigation equipment is classified as a major failure condition under airworthiness regulations (i.e. 1 × 10–5 per hour).

(3) 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.

(4) On-board performance and monitoring:

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 1 NM is greater than 1 × 10–5.

(5) Signal-In-Space:

If using GNSS, 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.

(b) Criteria for specific navigation systems:

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 should be provided to deselect the other navigation sensor types.

(c) Functional Requirements:

The following navigation displays and functions installed per FAA Advisory Circular AC 20-130A and AC 20-138A or equivalent airworthiness installation advisory material 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. These must be used as primary flight instruments for the navigation of the aircraft, for manoeuvre anticipation and for failure/status/integrity indication.

(2) The following system functions are required as a minimum within any RNP 1 equipment:

(i) 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 ATS routes can be retrieved and loaded into the RNP system. The stored resolution of the data must be sufficient to achieve negligible PDE. The database must be protected against pilot modification of the stored data;

(ii) The means to display the validity period of the navigation data to the pilot;

(iii) 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 route to be flown; and

(iv) The capacity to load from the database into the RNP 1 system the entire segment of the SID or STAR to be flown.

(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 active navigation sensor type;

(ii) the identification of the active (To) waypoint;

(iii) the ground speed or time to the active (To) waypoint;

(iv) the distance and bearing to the active (To) waypoint.

(4) The capability to execute a "direct to" function.

(5) The capability for automatic leg sequencing with the display of sequencing to the pilot.

(6) The capability to load and execute an RNP 1 SID or STAR from the on-board database, by procedure name, into the RNP system.

(7) 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.

(8) The aircraft must have the capability to automatically execute leg transitions consistent with VA, VM and VI ARINC 424 path terminators, or must be able to be manually flown on a heading to intercept a course or to go direct to another fix after reaching a procedure-specified altitude.

(9) The aircraft must have the capability to automatically execute leg transitions consistent with CA and FM ARINC 424 path terminators, or the RNP system must permit the pilot to readily designate a waypoint and select a desired course to or from a designated waypoint.

(10) The capability to display an indication of the RNP 1 system failure, in the pilot's primary field of view.

(d) Contingency navigation systems:

(1) For private operations under Part 91, the aircraft must be equipped with at least one independent alternative navigation system appropriate to enable the extraction and recovery of the aircraft.

(2) For commercial operations conducted under a Part 119 or 129 air operator certificate, the aircraft must be equipped with at least one independent alternative navigation system appropriate to allow continued safe navigation on the route being flown.

(e) Communication system requirements:

No special communication system requirements.

4. Operating Procedures

(a) Pre-flight planning:

(1) The on-board navigation data must be current and include appropriate procedures.

(2) The availability of the NAVAID infrastructure, required for the intended routes, including any non-RNAV contingencies, must be confirmed for the period of intended operations using all available information.

(3) Since GNSS integrity (RAIM or SBAS signal) is required by Annex 10, the availability of these should also be determined as appropriate.

(4) For aircraft navigating with SBAS receivers, operators should check appropriate GPS RAIM availability in areas where the SBAS signal is unavailable.

(b) ABAS availability:

Operators relying on GNSS are required to have the means to predict the availability of GNSS fault detection (e.g. ABAS RAIM) to support operations along the RNP 1 SID, or STAR.

(c) Augmented GNSS availability (SBAS):

RNP 1 is not dependent on the availability of SBAS service.

(d) 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 1 procedures unless they satisfy the requirements of this notice. If an aircraft not meeting these criteria receives a clearance from ATC to conduct an RNP 1 procedure, the pilot-in-command must advise ATC that he/she is unable to accept the clearance and must request alternate instructions.

(3) At system initialization, pilots must confirm that the aircraft position has been entered correctly. Pilots must

verify proper entry of their ATC assigned route upon initial clearance and any subsequent change of route. Pilots must ensure that the waypoint sequence depicted by their navigation system matches the route depicted on the appropriate chart(s) and their assigned route.

(4) Pilots must not fly an RNP 1 SID or STAR unless it is retrievable by procedure name from the on-board navigation database and conforms to the charted procedure. However, the procedure may subsequently be modified through the insertion or deletion of specific waypoints in response to ATC clearances. The manual entry, or creation of new waypoints, by manual entry of latitude and longitude or rho/theta values is not permitted. Additionally, pilots must not change any SID or STAR database waypoint type from a fly-by to a fly-over or vice versa

(5) Pilots should cross-check the cleared flight plan by comparing charts or other applicable resources with the navigation system textual display and the aircraft map display, if applicable. If required, the exclusion of specific NAVAIDs should be confirmed.

(6) For RNP 1 routes, pilots must use a lateral deviation indicator, flight director, or autopilot in lateral navigation mode. Pilots of aircraft with a lateral deviation display must ensure that lateral deviation scaling is suitable for the navigation accuracy associated with the route/procedure (e.g. full-scale deflection: ±1 NM for RNP 1).

(e) Pilot requirements specific to certain phases of flight:

(1) RNP1 SID specific requirements:

(i) Before commencing take-off, the pilot must verify that the aircraft's RNP1's system is available, operating correctly, and that the correct airport and runaway data are loaded.

(ii) Before flight, pilots must verify their aircraft navigation system is operating correctly and the correct runway and departure procedure (including any applicable en-route transition) are entered and properly depicted.

(iii) Pilots who are assigned an RNP 1 departure procedure and subsequently receive a change of runway, procedure or transition must verify that the appropriate changes are entered and available for navigation before take-off.

(iv) Pilots are recommended to complete a final check of proper runway entry and correct route depiction, shortly before take-off.

(v) Pilots must be able to use RNP 1 equipment to follow flight guidance for lateral navigation, e.g. lateral navigation no later than 153 m (500 ft) above airport elevation.

(vi) Pilots must use an authorised method (lateral deviation indicator or navigation map display/flight director/autopilot) to achieve an appropriate level of performance for RNP1 operations.

(vii) When using GNSS, pilots must ensure that the signal is acquired before the take-off roll commences.

(viii) For aircraft using TSO-C129a avionics, pilots must ensure that the departure airport is loaded into the flight plan in order to achieve the appropriate navigation system monitoring and sensitivity.

(ix) For aircraft using TSO-C145()/C146() avionics, if the departure begins at a runway waypoint, then the departure airport does not need to be in the flight plan to obtain appropriate monitoring and sensitivity.

(x) If the RNP 1 SID extends beyond 30 NM from the ARP and a lateral deviation indicator is used, pilots must ensure that its full-scale sensitivity is selected to not greater than 1 NM between 30 NM from the ARP and the termination of the RNP 1 SID.

(xi) For aircraft using a lateral using a lateral deviation display (i.e. navigation map display), the scale must

be set for the RNP 1 SID, and the flight director or autopilot should be used.

(2) RNP 1 STAR specific requirements:

(i) Before the arrival phase, the pilot should verify that the correct terminal route has been loaded.

(ii) The active flight plan should be checked by comparing the charts with the map display (if applicable) and the MCDU. This includes confirmation of the waypoint sequence, reasonableness of track angles and distances, any altitude or speed constraints, and, where possible, which waypoints are fly-by and which are fly-over.

(iii) If required by a route, a check will need to be made to confirm that updating will exclude a particular NAVAID.

(iv) A route must not be used if doubt exists as to the validity of the route in the navigation database.

(v) The creation of new waypoints by manual entry into the RNP 1 system by the pilot would invalidate the route and is not permitted.

(vi) Where the contingency procedure requires reversion to a conventional arrival route, necessary preparations must be completed before commencing the RNP 1 procedure.

(vii) Procedure modifications in the terminal area may take the form of radar headings or “direct to” clearances and the pilot must be capable of reacting in a timely fashion. This may include the insertion of tactical waypoints loaded from the database.

(viii) Manual entry or modification by the pilot of the loaded route using temporary waypoints or fixes not provided in the database is not permitted.

(ix) Pilots must verify their aircraft navigation system is operating correctly, and the correct arrival

procedure and runway (including any applicable transition) are entered and properly depicted.

(x) Although a particular method is not mandated, any published altitude and speed constraints must be observed.

(xi) Aircraft with TSO-C129a GNSS RNP systems: If the RNP 1 STAR begins beyond 30 NM from the ARP and a lateral deviation indicator is used, then full scale sensitivity should be manually selected to not greater than 1 NM prior to commencing the STAR.

(xii) For aircraft using a lateral deviation display (i.e. navigation map display), the scale must be set for the RNP 1 STAR, and the flight director or autopilot should be used.

5. Contingency procedures

(a) The pilot-in-command must ensure that ATC is notified of any loss of the RNP capability (integrity alerts or loss of navigation), together with the proposed course of action.

(b) If unable to comply with the requirements of an RNP 1 SID or STAR for any reason, pilots must advise ATS as soon as possible.

(c) Loss of RNP capability includes any failure or event causing the aircraft to no longer satisfy the RNP 1 requirements of the route.

6. Pilot knowledge and training

(a) Operators must ensure that pilots are trained and have appropriate knowledge of the topics contained in AC 91-21 specific to RNP1 operations.

(b) Pilots must be appropriately licensed, rated and endorsed on the specific equipment to be used for RNP1 operations, including knowledge of specific organisational standard operating procedures.

7. Navigation database

(a) The navigation database must be obtained from a supplier that complies with RTCA DO 200A/EUROCAE document ED 76, Standards for Processing Aeronautical Data.

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

(c) Aircraft operators should must conduct periodic checks of the operational navigation databases in order to meet existing quality system requirements.

8. RNP1 operations must be approved by Director

A pilot must not carry out RNP1 operations unless –

(a) all the applicable requirements of this notice are met; and

(b) the Director approves the operations.