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

Notice of Requirement

NTC 91.263

Baro-VNAV Navigation Specification

Revision 1
5 April 2025

Preliminary

The Director of Civil Aviation issues the following requirements ("the requirements"), conditions and restrictions relating to the use of the Baro - VNAV navigation specification under section 64(5) of the Civil Aviation Act 2023 and Civil Aviation Rule 91.263(a).

Purpose

The purpose of this notice is to specify the requirements for Baro-VNAV operations, determined by the Director under rule 91.263, regarding:

i. the application of the Baro-VNAV 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; and

vi. the operational and training requirements placed on flight crew members.

Rule 91.263(b) requires compliance with the requirements in this Notice to ensure the safe operation of aircraft using Baro-VNAV 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 64(5) of the Civil Aviation Act 2023. This section permits the Minister of Transport or the Governor-General to specify any terms and conditions within the rules:

- To require or provide for a matter to be determined, undertaken or approved by the CAA, the Director, or another person; or
- to empower the CAA, Director, or any 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.

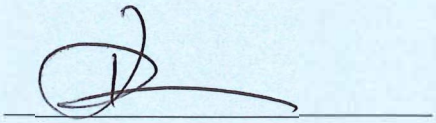
Related Rules

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

Effective Date

This notice comes into effect on 5 April 2025 and replaces the Notice dated 21 December 2022.

Issue of CAA Notice



13.1.25

Signed by
Director of Civil Aviation

Date

Revision History

Version	Amendment	Effective date
Revision 1	Original issue under Civil Aviation Act 2023	5 April 2025

Navigation Specification

1. Application

These requirements apply to every operator of an aircraft operating under instrument flight rules using a Baro-VNAV during RNP APCH or RNP AR APCH navigational procedures (RNP APCH or RNP AR APCH operations).

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 Baro -VNAV capability, including any limitations of functionality and performance.

(2) The operator must have a configuration list and, if necessary, a MEL detailing the required aircraft equipment for operations using Baro-VNAV.

(b) Training documentation:

(1) An air operator certificated under Part 119 must have a training programme addressing the operational practices, procedures and training phases related to Baro-VNAV operations.

(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 information or guidance on operational procedures referred to in clauses 4 and 5 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 operations using Baro-VNAV and specify the required dispatch conditions.

(2) Any MEL revisions necessary to address operations using Baro-VNAV must be approved by the Director.

(e) Continuing airworthiness:

The operator must submit to the Director -

(1) the continuing airworthiness instructions applicable to the aircraft's configuration and the aircraft's qualification for Baro-VNAV navigation procedure; and

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

3. Aircraft requirements

(a) The operator must ensure that the following requirements regarding Baro-VNAV system performance are met:

(1) Baro-VNAV approach operations are based upon the use of RNAV equipment that automatically determines aircraft position in the vertical plane using inputs from equipment that may include data from the following sources -

(i) FAA TSO-C106, Air Data Computer;

(ii) air data system, ARINC 706, Mark 5 Air Data System;

(iii) barometric altimeter system, DO-88 Altimetry, ED-26 MPS for Airborne Altitude Measurements and Coding Systems, ARP-942 Pressure Altimeter Systems, ARP-920 Design and Installation of Pitot Static Systems for Transport Aircraft; and type certified integrated systems providing an air data

system capability comparable to the systems referred to in paragraph (3); or

(iv) or any other data that is acceptable to the Director.

(v) The 99.7% aircraft ASE for each aircraft, assuming the temperature and lapse rates of the international standard atmosphere, must be less than or equal to the following:

$$ASE = -8.8 \cdot 10^{-8} \cdot H^2 + 6.5 \cdot 10^{-2} \cdot H + 50(\text{ft})$$

Where H is the true altitude of the aircraft

(b) The operator must ensure that the following requirements regarding system accuracy are met:

(1) For instrument approach operations, the error of the airborne Baro-VNAV equipment, excluding altimetry, should have been demonstrated to be less than that shown in the following table on a 99.7% probability basis.

	Level flight segments and climb/decent intercept altitude region of specified altitudes	Climb/decent along specified vertical profile (angle)
At or below 5,000 ft	50 ft	100 ft
5,000 ft to 10,000 ft	50 ft	100 ft
Above 10,000 ft	50 ft	100 ft

(2) With satisfactory displays of vertical guidance information, FTEs should have been demonstrated to be less than the values shown in the following table on a three-sigma basis.

	Level flight segments and climb/decent intercept altitude region of specified altitudes	Climb/decent along specified vertical profile (angle)
At or below 5,000 ft	150 ft	200 ft
5,000 ft to 10,000 ft	150 ft	300 ft
Above 10,000 ft	150 ft	300 ft

(3) Sufficient flight tests of the installation should have been conducted to verify that the values referred to in paragraph (2) can be maintained.

(4) Smaller values for FTEs may be achieved especially in the cases where the Baro-VNAV system is to be used only when coupled to an autopilot or flight director.

(5) Despite paragraph (4), the total system vertical accuracy shown in paragraph (6) is to be maintained.

(6) If an installation results in larger FTEs, the total vertical error of the system (excluding altimetry) may be determined by combining equipment and FTEs using the root sum square method, and the result is to be less than the values shown in the following table:

	Level flight segments and climb/decent intercept altitude region of specified altitudes	Climb/decent along specified vertical profile (angle)
At or below 5,000 ft	158 ft	224 ft

5,000 ft to 10,000 ft	245 ft	335 ft
Above 10,000 ft	245 ft	372 ft

(7) An acceptable means of complying with the accuracy requirements referred to in this notice is to have an RNP system approved for Baro-VNAV approaches in accordance with the criteria of FAA AC20-129 and an altimetry system approved in accordance with FAR/CS 25.1325 or an equivalent standard acceptable to the Director.

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

(1) Continuity of function:

For operations predicated on the use of Baro-VNAV capability, at least one RNP system is required.

(2) Path definition:

(i) The requirements for defining the vertical path are governed by the following 2 general requirements for operation -

(A) allowance for aircraft performance, and repeatability; and

(B) predictability in path definition.

(ii) The navigation system must be capable of defining a vertical path by a flight path angle to a fix and specifying a vertical path between altitude constraints at 2 fixes in the flight plan.

(iii) Fix altitude constraints must be defined as one of the following:

(A) an "AT OR ABOVE" altitude constraint such as 2400A, may be appropriate for situations where bounding the vertical path is not required;

(B) an "AT or BELOW" altitude constraint such as 4800B, may be appropriate for situations where bounding the vertical path is not required;

(C) an "AT" altitude constraint such as 5200; or

(D) a "WINDOW" constraint such as 2400A3400B.

(3) Vertical constraints:

Altitudes and/or speeds associated with published procedures must be automatically extracted from the navigation database upon selecting the approach procedure.

(4) Path construction:

The system must be able to construct a path to provide guidance from the current position to a vertically constraint fix.

(5) Capability to load procedures from the navigation database:

(i) The navigation system must have the capability to load and modify the entire procedures to be flown, based upon ATC instructions, into the RNP system from the on-board navigation database.

(ii) The procedures referred to in paragraph (i) include the approach, the missed approach and the approach transitions for the selected airport and runway.

(iii) The navigation system is to preclude modification of the procedure data contained in the navigation database.

(6) Temperature limits:

Aircraft using Baro-VNAV with temperature compensation or aircraft using an alternate means for vertical guidance such as SBAS may disregard the temperature restrictions.

(7) Guidance and control:

For the vertical performance requirements, the path steering error budget must reflect altitude reference and other factors, such as roll compensation and speed protection, as applicable.

(8) Display and control:

The display resolution (readout) and entry resolution for VNAV information is to be as follows:

Parameter	Display resolution (readout)	Entry resolution
Altitude	Flight level or (1 ft)	Flight level or (1 ft)
Vertical path deviation	10 ft	Not applicable
Flight path angle	0.1°	0.1°
Temperature	1°	1°

(9) Path deviation and monitoring:

(i) The navigation system must provide the capability to continuously display to the pilot flying, on the primary flight instruments for navigation of the aircraft, the aircraft position relative to the vertically defined path.

(ii) The display must allow the pilot to readily distinguish if the vertical deviation exceeds +75 ft/–

75 ft, and the deviation must be monitored, and appropriate action taken to minimise errors.

(iii) Except as provided in paragraph (iv), an appropriately-scaled non-numeric deviation display is to be located in the pilot's primary optimum field of view. A fixed-scale deviation indicator may be used if it demonstrates appropriate scaling and sensitivity for the intended operation. Any alerting and annunciation limits must also match the scaling values.

(iv) If an appropriately-scaled non-numeric deviation display is not available, a numeric display of deviation may be used depending on the pilot workload and the numeric display characteristics.

(v) Eligible aircraft must be equipped with and operationally using either a flight director or autopilot capable of following the vertical path.

(10) Barometric altitude:

(i) The aircraft must display barometric altitude from 2 independent altimetry sources, one in each pilot's primary optimum field of view.

(ii) Operators must ensure that their procedures provide for current altimeter settings for the selected instrument procedure and runway.

4. Operating Procedures

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.

5. Pilot knowledge and training

(a) Operators must ensure that pilots are trained and have appropriate knowledge of the topics specific to Baro-VNAV operations as contained in AC 91-21, and AC61-17 if applicable, including the limits of their Baro-VNAV navigation capabilities, the effects of

updating, and Baro-VNAV contingency procedures where specified.

(b) Pilots must be appropriately licensed, rated and endorsed on the specific equipment to be used for Baro-VNAV operations, 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 the procedures to the navigation database supplier;

(2) inform the pilots of the discrepancies; and

(3) prohibit the pilots from using the affected procedures; and

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

7. Operator to comply with requirements before carrying out Baro-VNAV operations

An operator must not carry out Baro-VNAV operations unless the operator complies with all the applicable requirements of this notice.