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|  | ΑΙΤΗΣΗ ΓΙΑ ΠΙΣΤΟΠΟΙΗΣΗ RNP APCH (LNAV and APV) Application Form for RNP APCH (LNAV APV) Approval (Airworthiness & Operational Approval Conformance Document) |
| |  |  |  | | --- | --- | --- | | REFERENCES | ISSUE DATE | TITLE | | **ED Decision 2013/026/R** | 12/09/2013 |  | | **AMC 20-27A** | 12/09/2013 | **Airworthiness Approval and Operational Criteria for RNP APPROACH (RNP APCH) Operations**  **Including APV BARO-VNAV Operations** | | **ICAO Doc 9613** | 2008 | **PBN Manual** | | |
| **1. Applicant / Operator:** | |
| Name:  Address:  Tel:  Fax:  Contact Person: | |
| **2. Aircraft:** | |
| Aircraft Type: Aircraft Registration: SX –  Aircraft S/N: | |
| **PART I Airworthiness** | |
| **3. Approval of the installation:** | |
| Type design : □ FAA STC: □ Service Buletin ; □  Major Modification : □ STC: □ EASA APPROVED STC : □  Other : □ JAA STC: □  *HCAA Note: Tick as appropriate* | |
| **4. Evidence of aircraft lateral performance** | |
| **YES : □ NO: □**  ***HCAA Note:*** *The applicant will need to submit to the HCAA evidence of the aircraft lateral performance (AFM/AOM/FCOM/etc)* | |
| **5.APV BARO-VNAV Operations** | |
| Applicant requests APV BARO Approach authorization  **YES : □ NO: □**  ***HCAA Note: Tick as appropriate*** | |
| **6.Existing Installations** | |
| Aircraft that are approved for RNP AR APCH operations are considered compliant with this AMC.  An existing statement in the AFM that indicates the aircraft is approved:  - to perform RNP 0.3 GNSS approaches or,  - for instrument approaches including a specification of RNP GNSS capability that meets RNP 0.3  is considered acceptable for lateral performance.  **YES : □ NO: □**  *HCAA Note: The applicant will need to submit to the HCAA the evidence for the above requirement* | |
| **7. New or Modified Installations** | |
| The applicant will need to submit to the HCAA a compliance statement which shows how the criteria of AMC-27A have been satisfied. The statement should be based on a plan, agreed by the HCAA at an early stage of the implementation programme.  **YES : □ N/A: □**  *HCAA Note: In case of new or modified installation the applicant will need to submit to the HCAA a compliance statement which shows how the criteria of the AMC 20-27A have been satisfied.* | |
| **8. RNAV SYSTEM** | |
| Manufacturer : Model installed : Model:    S/W version : No of units installed : TSO/ETSO:   1. RNAV installation based on GNSS stand-alone system :   the equipment shall be approved in accordance with TSO-C129a/ETSO-C129a  Class A1 or ETSO-C146()/TSO-C146() Class Gamma, operational class 1, 2 or 3  **YES : □ NO: □**  2) RNAV installation based on GNSS sensor equipment used in a multi-  sensor system (e.g. FMS), the GNSS sensor shall be approved in accordance  with TSO-C129( )/ ETSO-C129( ) Class B1, C1, B3, C3 or ETSO-C145( )/TSO-  C145( ) class Beta, operational class 1, 2 or 3.  **YES : □ NO: □**  3) Multi-sensor systems using GNSS should be approved in accordance with AC20-130A or ETSO-C115b/TSO-C115b, as well as having been demonstrated for RNP capability.  **YES : □ NO: □**  *HCAA Note: The Applicant should provide evidence for the above requirements* | |
| **9. RNAV System accuracy** | |
| **Horizontal**  The Lateral and Longitudinal Total System Error (TSE) of the on-board navigation system must be equal to or better than:  a) ±1 NM for 95 % of the flight time for the initial and intermediate approach segments and for the RNAV missed approach.  b) ±0.3 NM for 95 % of the flight time for the final approach segment.  [[An acceptable means of complying with these accuracy requirements is to have an RNAV system approved for RNAV approaches in accordance with 2D navigation accuracy criteria of **FAA** **AC 20-138**, **AC 20-138A** or AC **20-130A**. ]]  **YES : □ NO: □**  *HCAA Note: The Applicant should provide evidence for the above requirements* | |
| **10.Navigation Chart supplier** | |
| Does the supplier hold a TYPE 1 or TYPE 2 Letter of Acceptance (LOA) or ED-76 /DO-200 Approval? Show how you audit your supplier of navigation charts in order to establish the effectiveness of your supplier's quality system.  **YES : □ NO: □**  Outline your process for error reporting/withdrawal of operational use of procedures.  In particular, significant errors (i.e. those that would affect the flight path of the aircraft) must be reported to the database supplier immediately, and the affected procedures withdrawn from company operations by company instruction **without delay.** Any database or chart anomaly identified during RNAV operations must be reported to HCAA .  **YES : □ NO: □**  *HCAA Note: The Applicant should provide evidence for the above requirements* | |
| **11.MEL** | |
| The aircraft operator should propose an amendment to the Minimum Equipment List (MEL) appropriate to RNP APCH operations.  *HCAA Note: The Applicant should provide appropriate parts of the MEL* | |
| **12.Maintenance Program** | |
| Aircraft should have an established maintenance program for the individual navigation systems. For others installing navigation systems, the operator will submit those changes appropriate to their existing maintenance manual for review and acceptability.  *HCAA Note: The Applicant should provide appropriate parts of the AMP* | |

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| **Part II Operations** | | |
| **13.** **Required Function for RNP APCH** | | |
| Navigation data, including a to/from indication and a failure indicator, must be displayed on a lateral deviation display (CDI, (E)HSI) 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. They must meet the following requirements:  **1)** The displays must be visible to the pilot and located in the primary field of view (±15 degrees from pilot’s normal line of sight) when looking forward along the flight path.  **2)** The lateral deviation display scaling must agree with any alerting and annunciation limits, if implemented.  **3)** The lateral deviation display must also have a full-scale deflection suitable for the current phase of flight and must be based on the required total system accuracy. For installations having a lateral deviation display, its full-scale deflection must be suitable for the phase of flight and based on the required track-keeping accuracy. Scaling is ±1NM for the initial and intermediate segments and ±0.3 NM for the final segment.  **4)** The display scaling may be set automatically by default logic or set to a value obtained from a navigation database. The full-scale deflection value must be known or made available for display to the flight crew. Enhanced navigation display (e.g. electronic map display or enhanced EHSI) to improve lateral situational awareness, navigation monitoring and approach (flight plan) verification could become mandatory if the RNAV installation does not support the display of information necessary for the accomplishment of these crew tasks.  **YES : □ NO: □** | | |
| **5)**Capability to continuously display, to the pilot flying, the RNAV computed desired path (DTK), and the aircraft position relative to the path (XTK), on the primary flight instruments for navigation of the aircraft. Note: Where the minimum flight crew is two pilots, it shall be possible for the pilot not flying to verify the desired path and the aircraft position relative to the path*.*  **YES : □ NO: □** | | |
| **6)**A navigation database, containing current navigation data officially promulgated for civil aviation; a) which can be updated in accordance with the AIRAC cycle and b) from which approach procedures can be retrieved in their entirety and loaded into the RNAV system. The resolution to which the data is stored must be sufficient to ensure that the assumption of no path definition error is satisfied.  The database shall be protected against flight crew modification of the stored data.  Note: When a procedure is loaded from the database, the RNAV system is required to fly it as published. This does not preclude the flight crew from having the means to modify a procedure or route already loaded into the RNAV/GNSS system as permitted . However, the procedure stored in the database must not be modified and must remain intact within the database for future use and reference.  **YES : □ NO: □** | | |
| **7)**Means to display the validity period of the navigation database to the flight crew.  **YES : □ NO: □** | | |
| **8)**Means to retrieve and display data stored in the navigation database relating to individual waypoints and navigation aids, to enable the flight crew to verify the procedure to be flown.  **YES : □ NO: □** | | |
| **9)**Capacity to load from the database into the RNAV system the whole approach procedure to be flown.  **YES : □ NO: □** | | |
| **10)**Display of the identification of the active (To) waypoint, either in the pilot’s primary field of view, or on a readily accessible page on the RNAV CDU, readily visible to the flight crew.  **YES : □ NO: □** | | |
| **11)**Display of distance and bearing to the active (To) waypoint in the pilot’s primary field of view. Where impracticable, the data may be displayed on a readily accessible page on the RNAV CDU, readily visible to the flight crew.  **YES : □ NO: □** | | |
| **12)**Display of distance between flight plan waypoints. The navigation system must provide the ability to display the distance between flight plan waypoints.  **YES : □ NO: □** | | |
| **13)**Display of distance from present position to any selected waypoint. The navigation system must provide the ability to display the distance to any waypoint selected by the flight crew. Such selection should not impact the active flight plan.  **YES : □ NO: □** | | |
| **14)**Display of ground speed or time to the active (To) waypoint, either in the pilot’s primary field of view, or on a readily accessible page on the RNAV CDU, readily visible to the flight crew.  **YES : □ NO: □** | | |
| **15)**Capability for the ‘Direct to’ function.  **YES : □ NO: □** | | |
| **16)**Capability for automatic leg sequencing with display of sequencing to the flight crew.  **YES : □ NO: □** | | |
| **17)**Capability to execute database procedures including: a) fly-over and b) fly-by turns.  **YES : □ NO: □** | | |
| **18)**Capability to execute leg transitions and maintain tracks consistent with the following ARINC 424 path terminators (automatic capability), or their equivalent: Initial Fix (IF), Track to Fix (TF), Direct to Fix (DF) Note: Path terminators are defined in ARINC Specification 424, and their application is described in more detail in documents PANS-OPS, EUROCAE ED-75()/RTCA DO-236(), ED-77/RTCA DO-201A, and EUROCONTROL Document NAV.ET1.ST10.  **YES : □ NO: □** | | |
| **19)**Capability to automatically execute leg transitions consistent with ARINC 424 FA path terminators, or the RNAV system must permit the pilot to fly a course and turn at a designated altitude. If manual intervention is necessary to turn at the designated altitude, the associated crew workload shall be assessed  **YES : □ NO: □** | | |
| **20)**Indication of the RNAV system failure leading to the loss of navigation function in the pilot’s primary field of view (e.g. by means of a navigation warning flag on the navigation display).  **YES : □ NO: □** | | |
| **21)**Indication of the Loss Of Integrity (LOI) function (e.g. loss of RAIM) in the pilot’s normal field of view (e.g. by means of an appropriately located annunciator). Note: Systems providing RNP alerts that reflect loss of GNSS integrity are considered acceptable.  **YES : □ NO: □** | | |
| **22)**Capability for the accomplishment of holding patterns and procedure turns. Activation of this function shall at least:  a) Change automatic waypoint sequencing to manual.  b) Permit the pilot to readily designate a waypoint and select a desired course (by means of a numerical keypad entry, HSI course pointer, CDI omni-bearing selector, etc.) to or from the designated waypoint (TO/FROM mode operation is acceptable).  c) Retain all subsequent waypoints in the active flight plan in the same sequence.  d) Permit the pilot to readily return to automatic waypoint sequencing at any time prior to the designated fix (‘TO’ waypoint) and continue with the existing flight plan.  **YES : □ NO: □** | | |
| **13.2 Recommended Function for RNP APCH** | | |
| Capability, following ATC instructions, to immediately provide horizontal track deviation indications relative to the extended final approach segment, in order to facilitate the interception of this extended final approach segment from a radar vector.  **YES : □ NO: □** | | |
| Course selector of the deviation display automatically slaved to the RNAV computed path. Note: Systems with electronic map display in the pilot's primary field of view having a depiction of the active route are sufficient.  **YES : □ NO: □** | | |
| **14.Vertical accuracy for APV BARO-VNAV operation.** | | |
| **1)**  Each system must be designed and installed so that the error in indicated pressure altitude, at sea-level, with a standard atmosphere, excluding instrument calibration error, does not result in an error of more than ±9 m (±30 ft) per 185 km/hr (100 knots) speed for the appropriate configuration in the speed range between 1·23 VSR0 with wing-flaps extended and 1·7 VSR1 with wing-flaps retracted. However, the error need not be less than ±9 m (±30 ft).  **YES : □ NO: □**  **[[**An acceptable means of complying with the above accuracy requirements is to have the VNAV system approved for RNAV approaches in accordance with FAA AC 20-129]]  *HCAA Note: The Applicant should provide evidence for the above requirements*  **2)** APV BARO-VNAV deviation must be displayed on a vertical deviation display (HSI, EHSI, VDI). This display must be used as primary flight instruments for the approach. The display must be visible to the pilot and located in the primary field of view (±15 degrees from pilot’s normal line of sight) when looking forward along the flight path. The deviation display shall have a suitable full-scale deflection based on the required vertical track error. The non-numeric display must allow the fight crew to readily distinguish if the vertical deviation exceeds ±75 feet. If the non-numeric display does not permit the fight crew to readily distinguish excessive vertical deviations, the approach must be conducted with the flight director and/or the autopilot and a numeric display should allow the pilot to readily distinguish if the vertical deviation exceeds ±75 feet  Capability to continuously display, to the pilot flying, the vertical deviation relative to the Final approach segment on the primary flight instruments for navigation of the aircraft. Note: Where the minimum flight crew is two pilots, a means for the pilot not flying to verify the desired path and the aircraft position relative to the path shall be provided.  **3)** The navigation system must be capable of defining a vertical path in accordance with the published vertical path. Note: The VNAV equipment error budget (see 6.3.2.b) includes the path approximation error.  User Interface (Displays and Control) The display readout and entry resolution for vertical navigation information shall be as follow:  **YES : □ NO: □**  **4)** The navigation database must contain all the necessary data/information to fly the published APV BARO-VNAV approach. The navigation database must contain the waypoints and associated vertical information (e.g. VPA) for the procedure. Vertical Constraints associated with published procedures must be automatically extracted from the navigation database upon selecting the approach procedure.  Indication of loss of navigation (e.g. system failure) in the pilot’s primary field of view by means of a navigation warning flag or equivalent indicator on the vertical navigation display.  The aircraft must display barometric altitude from two independent altimetry sources, one in each pilots’ primary field of view. When single pilot operation is permitted, the two displays must be visible from the pilot position.  **YES : □ NO: □** | | |
| **14.2 Additional required function for APV BARO-VNAV operation** | | |
| |  |  | | --- | --- | | **1)** APV BARO-VNAV deviation must be displayed on a vertical deviation display (HSI, EHSI, VDI).  This display must be used as primary flight instruments for the approach. The display must be visible to the pilot and located in the primary field of view (±15 degrees from pilot’s normal line of sight) when looking forward along the flight path.  The deviation display shall have a suitable full-scale deflection based on the required vertical track error.  The non-numeric display must allow the fight crew to readily distinguish if the vertical deviation exceeds ±75 feet.  If the non-numeric display does not permit the fight crew to readily distinguish excessive vertical deviations, the approach must be conducted with the flight director and/or the autopilot and a numeric display should allow the pilot to readily distinguish if the vertical deviation exceeds ±75 feet,  **YES : □ NO: □**   |  | | --- | | **2)** Capability to continuously display, to the pilot flying, the vertical deviation relative to the Final approach segment on the primary flight instruments for navigation of the aircraft. Note: Where the minimum flight crew is two pilots, a means for the pilot not flying to verify the desired path and the aircraft position relative to the path shall be provided.  **YES : □ NO: □** |   **3)** The navigation system must be capable of defining a vertical path in accordance with the published vertical path. Note: The VNAV equipment error budget (see 6.3.2.b) includes the path approximation error.  User Interface (Displays and Control) The display readout and entry resolution for vertical navigation information shall be as follow: Parameter Display resolution Entry resolution Altitude Above altitude transition level Flight Level Flight Level Below altitude transition level 1 foot 1 foot Vertical Path Deviation 10 feet Not applicable Flight Path Angle 0.1 degree (\*) 0.1 degree Temperature 1 degree 1 degree *(\*) A Display resolution of 0.01 degree is recommended*  **YES : □ NO: □** | | | |
| **15. Flight Operations Documentation** | | |
| The following parts of applicant Operations manual should refer to : | | |
| **Part A** RNAV concepts.  Navigation accuracy assessment at dispatch, for destination and alternates.  RTF phraseology.  MEL handling  SOPs (*HCAA Note: Refer to item 19*)  Crew Authorisation required/validation | | |
| **Part B**  Technical information and MEL. | | |
| **Part C** Inclusion of RNP APCH procedures | | |
| **Part D**  Training programme in accordance with RNP APCH operations | | |
| **HCAA Note:** 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 in this section and, in particular those in AMC 20-27A APPENDIX 4. | | |
| **16. Pre-Dispatch** | | |
| MEL.  RAIM/AIME.  NOTAMs/Navigation infrastructure | | |
| **17. Aerodrome competence and Operator verification** | | |
| Before planning a flight to an aerodrome (destination or alternate) with the intent to use an RNAV procedure contained in the Navigation Database, the operator should determine the operational characteristics of the procedure in accordance with EU OPS 1.975 or the applicable operational regulations. Further details are provided in APPENDIX 2.  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. | | |
| **18.Flight Crew Training** | | |
| **HCAA Note:** Training should cover both normal and abnormal procedures. Standard training and checking, such as recurrent aeroplane/STD training and proficiency checks, should include RNP APCH procedures. Based on this, the operator should determine what constitutes a qualified crew. | | |
| 19 .SOPs | | |
| MEL handling: Items required for RNP approach operations.  Required equipment list.  Statement that autopilot/flight director should be used whenever possible (must be used for Baro-VNAV).  SOPs for which pages should be displayed on the FMC for RNP approach (PF and PNF).  Database Validity Check.  Monitoring of system navigation accuracy.  Approach Validity Check including confirmation of procedure track and distance.  Navigation System Downgrade Procedure.  Contingency procedures if unable to meet RNP.  Statement that crew should not manually insert WPs into the procedure.  Statement that crew should not carry out RNP approach operations until suitable training completed.  Details of procedures to be used in the event of missed approach, e.g. conventional missed approach or RNAV.  APV Baro-VNAV:  Use of GNSS altitude information prohibited.  Procedures for cross-checking altimeters and pressure settings.  Procedures for the use of temperature compensation.  Deviations above/below vertical path should not exceed +100/-50 feet (missed approach if exceeded).  *HCAA Note:*  *Manufacturer's procedures recommended as starting point and must include at least the above .* | | |
| 20. Application package to be submitted | | |
| For all of the above substantiating data should be provided | | |
| ***21. Applicant Compliance statement*** | | |
| ***I hereby declare that all documentation and information submitted have been verified and found in compliance with Regulation (EC) No 216/2008, its Implementing Rules and all other applicable requirements/procedures.*** | | |
| **Continuing Airworthiness Manager**  **(name)** |  | **(Signature)** |
| **Flight Operation Manager**  **(name)** |  | **(Signature)** |
| **Date** | | |