
GACAR PART 172 – INSTRUMENT FLIGHT PROCEDURE SERVICES

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GACAR PART 172 – INSTRUMENT FLIGHT PROCEDURE SERVICES

SUBPART A – GENERAL

§ 172.1 Purpose.

(a) This part prescribes rules governing the development, validation, approval, registration, promulgation and maintenance of instrument flight procedures (IFP) that are intended for use by civil aircraft operating under instrument flight rules (IFR) within the territorial limits of the Kingdom of Saudi Arabia (KSA).

(b) All approved IFP intended for public use are identified in GACAR Part 97 and published in the KSA Aeronautical Information Publication (AIP).

§ 172.3 Applicability.

(a) Except as provided in paragraph (b) of this section, this part prescribes rules governing—

(1) Instrument flight procedure services (IFPS) provided by an IFPS provider that holds or is required to hold an Air Navigation Service Certificate (ANSC) under General Authority of Civil Aviation Regulation (GACAR) Part 170;

(2) Each person employed or used by a IFPS provider when developing and maintaining IFP under this part; and

(3) Each Aeronautical Information Service (AIS) provider supplying aeronautical data in support of IFP design, development and promulgation.

(b) This part does not apply to IFPS providers who are developing and maintaining IFP exclusively for military flight operations.

(c) Additional requirements applicable to the establishment of airspace, routes, points and minimum altitudes are prescribed under GACAR Part 171.

(d) Additional requirements applicable to the publication and distribution of the aeronautical charts associated with IFP procedures are prescribed under GACAR Part 175.

§ 172.5 Requirement for a Custodian and Restrictions on IFPS Providers.

(a) Each IFP intended for use by aircraft operating under instrument flight rules within the territorial limits of the KSA must have a custodian who –

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- (1) Meets the applicable requirements of this part; and
- (2) Is certificated by the President under GACAR Part 170 to be an IFPS provider.

(b) No person may provide an instrument flight procedure service in the Kingdom of Saudi Arabia unless the person complies with the provisions of this part and they have been certificated by the President under GACAR Part 170 to provide such service.

(c) Except as provided in GACAR Part 170, each IFPS provider must comply with the limitations and provisions of their certificate, operations specifications and their manual prepared under Subpart C to this part.

§ 172.7 Resource Requirements.

Each IFPS provider must—

- (a) Have available equipment that is appropriate for the design, design verification, flight validation, declaration, and maintenance of the types of IFP that they wish to manage;
- (b) Have access to relevant and current data including, but not limited to, aeronautical data, land contour data, and obstacle data for the design, design verification, flight validation, and maintenance of their IFP; and
- (c) Hold or have ready access to copies of relevant documentation comprising technical standards, practices, and instructions, and any other documentation that may be necessary for the design, design verification, flight validation, declaration, and maintenance of the types of IFP they wish to manage.

§ 172.9 Aeronautical Data Integrity.

(a) Determination and reporting of aeronautical data must be in accordance with the accuracy and integrity requirements prescribed in GACAR Part 171 and GACAR Part 139. Accuracy requirements for aeronautical data are based upon a 95 per cent confidence level. Three types of positional data must be identified: surveyed points (e.g. navigation aids positions), calculated points (mathematical calculations from the known surveyed points of points in space/fixes) and declared points.

(b) Each AIS provider must ensure that integrity of aeronautical data is maintained throughout the

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data process from survey/origin to the next intended user. The integrity classification related to aeronautical data must be as provided in Tables A7-1 to A7-5 of Appendix 7 of ICAO Annex 15. Aeronautical data integrity requirements must be based upon the potential risk resulting from the corruption of data and upon the use to which the data item is put. Based on the applicable integrity classification, the validation and verification procedures must:

- (1) For routine data: avoid corruption throughout the processing of the data;
- (2) For essential data: assure corruption does not occur at any stage of the entire process and may include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and
- (3) For critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance processes to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

(c) Protection of electronic aeronautical data while stored or in transit must be totally monitored by the cyclic redundancy check (CRC). To achieve protection of the integrity a 32-bit CRC algorithm must apply.

(e) Geographical coordinates indicating latitude and longitude must be determined and reported to the aeronautical information services provider in terms of the World Geodetic System — 1984 (WGS 84) geodetic reference datum, identifying those geographical coordinates which have been transformed into WGS 84 coordinates by mathematical means and whose accuracy of original field work does not meet the requirements in GACAR Part 171 and GACAR Part 139.

(f) The order of accuracy of the field work and determinations and calculations derived therefrom must be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame, as indicated in the GACAR Part 171 and GACAR Part 139. For those fixes and points that are serving a dual purpose, e.g. holding point and missed approach point, the higher accuracy applies.

§ 172.11 Inspections.

Each IFPS provider must allow the President to make any inspections, at any time, in order to allow the President to determine compliance with this part.

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SUBPART B – PERSONNEL REQUIREMENTS

§ 172.21 Personnel Requirements.

(a) Each IFPS provider must employ, contract, or otherwise engage—

(1) A person, identified for the purposes of this part as the director of instrument flight procedure services, who must—

(i) Have the authority within the custodian’s organization to ensure that the organization’s IFPS provider services can be financed and provided in accordance with the requirements and standards prescribed by this part; and

(ii) Be responsible for ensuring that the organization complies with the requirements of this part.

(2) A chief designer, responsible for—

(i) Ensuring that the custodian’s organization complies with the organization’s procedures for developing and validating IFP; and

(ii) Making the declaration of compliance required for every IFP provided by the custodian’s organization for publication in the KSA AIP and otherwise made available for publication and operational use.

(3) Sufficient personnel to plan, design, verify, and maintain the IFP provided by the custodian’s organization.

(b) Each IFPS provider must establish a procedure for initially assessing, training, and maintaining, the competence of those personnel involved in the planning, design, verification, and maintenance of IFP. These procedures must comply with GACAR § 172.25.

§ 172.23 Declarations Concerning Instrument Flight Procedures.

Each IFPS provider must establish a procedure for the chief designer to declare that an IFP has been designed in accordance with and meets every applicable standard and requirement prescribed by this part.

§ 172.25 Procedure Designer Qualification and Training.

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- (a) Each IFPS provider must ensure that IFP designers have acquired and maintain the necessary competency level through training and supervised on-the-job training (OJT).
- (b) Training for IFP designers must include an initial training and recurrent training at periodic intervals not to exceed 3 years.
- (c) Initial training must ensure that the IFP designer is able to demonstrate a basic level of competency that includes at least the following elements:
- (1) Knowledge of information contained in the IFP design criteria prescribed in Subpart D to this part; and
 - (2) Skills in the design of procedures.
- (d) Recurrent training must ensure that the IFP designer is able to demonstrate a basic level of competency that includes at least the following elements:
- (1) Knowledge about updates in ICAO provisions and other provisions pertaining to IFP design; and
 - (2) Maintenance and enhancement of knowledge and skills in the design of IFP.
- (e) Each IFPS provider must ensure that flight procedure designers have undergone an adequate, supervised OJT.

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SUBPART C – MANUAL REQUIREMENTS

§ 172.31 General.

- (a) This subpart prescribes requirements for each IFPS provider to prepare and maintain a manual.
- (b) Each manual, and all of its revisions, must be acceptable to the President.
- (c) Each IFPS provider must—
 - (1) Ensure that its manual is amended, as required, to remain a current description of the IFPS provider’s organization, personnel and procedures;
 - (2) Ensure that any amendments made to its manual meet the applicable requirements of this part;
 - (3) Comply with the manual amendment procedure contained in its manual;
 - (4) Provide the President with a copy of each amendment to its manual, immediately after the amendment is incorporated into the manual; and
 - (5) Make such amendments to its manual as the President may consider necessary in the interests of aviation safety.

§ 172.33 Manual Contents.

- (a) Each IFPS provider must provide the President with a manual containing—
 - (1) A statement signed by the director of instrument flight procedure services , on behalf of the organization, confirming that—
 - (i) The manual defines the organization and demonstrates its means and methods for ensuring ongoing compliance with this part; and
 - (ii) The manual, and all associated manuals, operating, and maintenance instructions, must be complied with by the organization's personnel at all times.
 - (2) The titles and names of the chief designer required under GACAR § 172.21(a)(2) and all

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qualified designers.

- (3) The duties and responsibilities of the chief designer and all qualified designers.
 - (4) An organization chart showing lines of responsibility of the senior persons in paragraph (a)(2) of this section.
 - (5) A summary of the organization's staffing structure.
 - (6) The detailed procedures required under Subpart D regarding IFP development.
 - (7) The detailed procedures required under Subpart E regarding IFP validation.
 - (8) The detailed procedures required under Subpart F regarding IFP design submissions and declarations.
 - (9) The detailed procedures required under Subpart G regarding IFP promulgation.
 - (10) The detailed procedures required under Subpart H regarding IFP maintenance.
 - (11) The IFP register required under GACAR § 172.105.
 - (12) The detailed procedures required under Subpart I regarding quality assurance.
 - (13) The detailed procedures, or an outline of the procedures including information that identifies the documentation that contains the detailed procedures, that are required under—
 - (i) GACAR § 172.9 regarding data integrity;
 - (ii) GACAR § 172.57(a) regarding the control, calibration, and maintenance of inspection, measuring, and test equipment; and
 - (iii) GACAR § 172.141 regarding the identification, collection, indexing, storage, maintenance, and disposal of records.
 - (14) Detailed procedures to control, amend, and distribute the manual.
- (b) The policies and procedures contained in the manual must not be contrary to any applicable

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GACAR.

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SUBPART D — DEVELOPMENT OF INSTRUMENT FLIGHT PROCEDURES

§ 172.41 General.

(a) In the interest of efficiency, regularity and economy, every effort must be made to ensure that instrument approach procedures (IAP) are evolved so as to keep to the minimum consistent with safety, both the time taken in executing an instrument approach and the airspace necessary for the associated maneuvers.

(b) Except as provided in (c), only one IAP may be promulgated for each type of radio aid in relation to a particular runway.

(c) More than one IAP may be promulgated for each type of radio aid in relation to a particular runway if authorized by the President and only after joint consideration by the operators concerned.

(d) IFPS providers must take steps during the development of IFP to minimize the disturbance to the local population caused by aircraft noise. When directed by the President, IFPS providers must consult local noise abatement committees or similar bodies representing the populace of local communities/towns, local authorities, aerodrome and aerodrome and airspace users. The President may prescribe other requirements addressing how local noise abatement committees are included in the planning and introduction of new departure routes.

(e) The specifications contained in this subpart are based on conventional navigation equipment and operating practices and have been formulated with a view to achieving a reasonable degree of standardization. Exceptions are permitted only after joint consideration by the President and the operators concerned.

§ 172.43 Design of Instrument Flight Procedures.

(a) Each IFPS provider must establish detailed procedures for ensuring that every IFP developed is—

(1) Designed or amended by a qualified designer, or an unqualified designer under supervision of a qualified designer, using methods ensuring that the procedure meets the applicable design criteria prescribed in GACAR § 172.45;

(2) Independently verified by a qualified designer who is independent of the person directly

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responsible for the design; and

(3) Validated as prescribed in Subpart E of this part.

(b) Each IFPS provider must establish detailed procedures for ensuring that during the processes of design, maintenance, or transfer of data of an IFP—

(1) The applicable aeronautical data and aeronautical information complies with the standards specified in RTCA Inc. document number RTCA/DO-201A Standards for Aeronautical Information;

(2) Manipulation or processing of aeronautical data complies with the standards specified in RTCA Inc. document number RTCA/DO-200A Standards for Processing Aeronautical Data; and

(3) Any transfer of aeronautical information within the custodian's organization, or to or from external entities, complies with the standards specified in the Aeronautical Information Transfer Model (AIXM-5).

§ 172.45 Design Criteria.

(a) Every IFP must be designed in accordance with the appropriate design processes, standards, guidelines, and aeronautical data quality requirements contained in the following:

(1) ICAO Documents—

(i) Doc. 8168, Procedures for Air Navigation Services – Aircraft Operations — Volume I Flight Procedures, and Volume II, Construction of Visual and Instrument Flight Procedures;

(ii) Doc. 8697, Aeronautical Chart Manual;

(iii) Doc. 9365, Manual of All-Weather Operations;

(iv) Doc. 9613 Performance Based Navigation Manual — Volume I Concept and Implementation Guidance, and Volume II Implementing RNAV and RNP;

(v) Doc. 9905 Required Navigation Performance Authorization Required (RNP AR)

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Procedure Design Manual;

(vi) Doc. 9881, Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information; and

(vii) Doc. 9906, Quality Assurance Manual for Flight Procedure Design.

(2) Any other guideline or standard that is applicable to a particular type of instrument flight procedure and that is acceptable to the President.

(b) For the purposes of paragraph (a), if there is a conflicting difference between any of the applicable design processes, standards, guidelines, or aeronautical data quality requirements, the particular design process, standard or guideline to be used must be acceptable to, or specified by, the President.

(c) The design of an IFP must—

(1) Be coordinated with all appropriate air traffic service (ATS) providers; and

(2) Be compatible with any air traffic service and associated procedure that is provided within the area or areas of airspace where the IFP is intended to be established; and

(3) Take into account—

(i) Any special air traffic rules prescribed by GACAR Part 93;

(ii) Any other regulation restricting aircraft operations;

(iii) The classification and any associated designation of the airspace in which the IFP is to be established and any adjacent airspace that may be affected by the procedure; and

(iv) The effect that the proposed IFP may have on any other IFP established in the airspace.

(d) An IFP must not be designed for an aerodrome (including heliports) unless the operator of the aerodrome agrees in writing that the aerodrome may be used for IFR operations using the intended IFP procedure.

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(e) An IFP must not be designed on or use a ground based aeronautical facility unless—

(1) The aeronautical facility is operated under the authority of an aeronautical telecommunication service operated in accordance with GACAR Part 173; and

(2) The holder of the aeronautical telecommunication service agrees in writing that the aeronautical facility can be used for the intended IFP.

§ 172.47 Terrain Data to be Used in Instrument Flight Procedures Design.

(a) Terrain data and associated criteria relating to electronic terrain, obstacle and aerodrome mapping information must comply with the guidelines provide in ICAO Doc 9881 – *Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information*, and documents referenced by ICAO Doc 9881.

(b) When designing IFP, an IFPS provider may:

(1) Utilize Shuttle Radar Terrain Model (SRTM) digital elevation data provided the data meet applicable accuracy and resolution requirements; and/or

(2) Apply such vertical and horizontal tolerances as are required based on the accuracy of available obstacle data, provide the tolerances applied are not less than any published ICAO tolerances for that obstacle type. All such added tolerances, and their sources, must be clearly identified in the design submission.

§ 172.48 Determination of Visibility Minima Required to be Published in Instrument Flight Procedure Design.

Each IFPS provider must establish and publish visibility minima for each instrument approach procedure and circling procedure in accordance with the criteria in documents identified in GACAR § 172.45 (a) (1), or other criteria approved by the President.

§ 172.49 Use of Design Automation Tools.

(a) Each IFPS provider must utilize design automation tools to the maximum extent practicable in the design of each IFP in order to minimize the potential for design errors.

(b) Each IFPS provider must ensure all design automation tools are validated prior to use using a tool validation methodology acceptable to the President.

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SUBPART E - VALIDATION OF INSTRUMENT FLIGHT PROCEDURES

§ 172.51 General.

- (a) This subpart prescribes the requirements for the validation of IFP.
- (b) Validation comprises a ground validation element and may also comprise a flight validation element. In the case of RNAV procedures, a navigation database validation is also required.

§ 172.53 Validation Package.

- (a) Each IFPS provider must compile an IFP validation package for use in the ground/flight validation process. Each validation package must include the following:
 - (1) A plan view of the final approach obstacle evaluation template, drawn on an appropriate topographical map of scale 1:50,000 to safely accommodate use for navigation, elevated terrain analysis, obstacles and obstructions evaluation;
 - (2) Completed documents that identify associated terrain, obstacles and obstructions as applicable to the procedure. The controlling terrain/obstacle must be identified and highlighted on the appropriate chart;
 - (3) Minimum altitudes determined to be applicable from map studies and database information for each segment of the procedure;
 - (4) A narrative description of the IFP;
 - (5) Plan and profile pictorial views of the IFP;
 - (6) Documented data as applicable for each fix, intersection, and/or holding pattern; and
 - (7) The output from the NAVAID coverage analysis together with any supporting data and design assumptions.
- (b) Each IFPS provider is responsible for all elements of the validation and must document their proposed validation activities in a plan and submit as early as possible to GACA SS&AT for acceptance.

§ 172.55 Ground Validation.

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(a) Each IFPS provider must establish detailed procedures for conducting the ground validation of an IFP. The aim of ground validation is to reveal any errors in criteria application and documentation, and assess the flyability of the IFP.

(b) Ground validation must comprise the following elements:

(1) Aerodrome assessment - Verification that the infrastructure required for the provision of an instrument runway as required by GACAR Part 139 is in place;

(2) Navigational aid coverage – Verification that the navigational aid coverage infrastructure required for the IFP as required by GACAR Part 173 and ICAO Doc. 8071 is in place;

(3) Obstacle clearance review – A review conducted by an authorized designer not involved in the design of the considered IFP for each route segment;

(4) Coding review – A review of the coding of RNAV IFP conducted by an authorized designer not involved in the design; and

(5) Flyability assessment – Verification that the IFP can actually be flown. The use of software tools is preferred, (e.g. PC-based to full flight simulator), in order to evaluate a range of aircraft types in various weight, speed and center of gravity configurations, and in various weather conditions (temperature, wind effects and visibility).

(c) Where a flyability assessment is conducted using a full flight simulator the following elements must be evaluated:

(1) All segments of the IFP must be assessed;

(2) In the case of SIDs and PDRs, all segments of the procedure from the departure end of the runway (DER) to joining the en-route structure or termination point must be assessed; and

(3) In the case of IAPs all segments of the procedure from the Arrival/ Initial Fix through to the Missed Approach must be assessed.

(d) Where procedures share the same segment of flight (e.g. initial), the shared segment needs only to be validated once.

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(e) In the case of RNAV IFP a test database for the full flight simulator produced by an appropriate navigation data provider for use in the flight management system (FMS) must be used.

(f) Where a ground validation cannot fully verify the accuracy and completeness of all obstacle and navigation data considered in the procedure design or the flyability of the IFP, a flight validation must be conducted. In determining whether a flight validation is required the custodian must consider a number of factors. These include, but are not limited to the following:

- (1) Deviation from design criteria prescribed in Subpart D;
- (2) Speed restrictions applied in the design;
- (3) Any segment length less than minimum prescribed optimum length;
- (4) A descent gradient used in the design greater than 6.1% for a non-precision approach and 3.5° for a precision approach;
- (5) Procedures designed for use in a challenging terrain area and/or dense obstacle environment;
- (6) Use of a Step Down Fix (SDF) in the final approach segment;
- (7) A track change of greater than 90° at a waypoint has been used within an RNAV procedure;
- (8) The introduction of new procedures at an aerodrome;
- (9) A procedure type that is new; and
- (10) Special crew procedures and/or operational techniques likely to be necessary to fly the procedures.

§ 172.57 Flight Validation.

(a) Each IFPS provider must establish detailed procedures for conducting the flight validation of an IFP as required by this section. The flight validation procedures must include the use of equipment that—

- (1) Has the precision, and accuracy traceable to appropriate standards, that are necessary for

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the validation being performed;

(2) Has known measurement uncertainties including, but not limited to, the software, firmware and crosswind uncertainties;

(3) Records the actual flight path of the validation aircraft;

(4) Is checked before being released for use, and at intervals not exceeding the calibration intervals recommended by the manufacturer, to establish that the system is capable of verifying the integrity of the IFP; and

(5) Is operated in accordance with flight validation system procedures and criteria by persons who are competent and current on the system used.

(b) Except as provided in paragraph (c), each IFP must be flight validated in accordance with the procedures required under paragraph (a) to ensure that—

(1) The IFP allows aircraft using the procedure to maneuver consistently within safe operating practices and pilot workloads for the categories of aircraft that the procedure is intended for;

(2) The IFP provides azimuth and distance information, and vertical guidance information for a precision approach ensure that an aircraft using the procedure remains clear of obstacles;

(3) The IFP is not affected by any radio frequency interference; and

(4) Visual guidance systems and cues for the runway are appropriate for the IFP and are not confused by lighting, pyrotechnic or laser displays, or any other visual distraction.

(c) The following IFP procedures do not require flight validation if it can be shown that current obstacle data meets the design requirements of the IFP:

(1) An en-route or an instrument arrival procedure unless—

(i) There is doubt about the coverage of the navigation system supporting the requirements of the procedure; or

(ii) The procedure limits the flyability and performance characteristics of the class of

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aircraft the procedure is designed for:

(2) An instrument departure procedure unless the procedure limits the flyability and performance characteristics of the class of aircraft the procedure is designed for:

(3) An amendment of a previously flight validated IAP if —

(i) The design change can be verified during the design process; and

(ii) A safety assessment of the proposed amendment has been completed and confirms that no additional risks to the safety of the procedure are introduced by the amendment.

(d) Where a flight validation is conducted the following elements must be evaluated:

(1) All segments of the IFP must be flown;

(2) In the case of SIDs and PDRs, all segments of the procedure from the departure end of the runway (DER) to joining the en-route structure or termination point must be flown; and

(3) In the case of IAPs all segments of the procedure from the Arrival/ Initial Fix through to the end of the Missed Approach must be flown.

(4) Flight validation of the visual maneuvering area must also be carried out.

(e) Where procedures share the same segment of flight (e.g. initial), the shared segment needs only to be validated once.

(f) In the case of RNAV IFP a test database produced by an appropriate navigation data-coding provider for use in the RNAV system must be used.

(g) In the case of RNAV (GNSS) IAPs of a T- or Y- bar design, manual entry of the procedure into the RNAV system in use is acceptable. In this case the validating pilot will need to manually activate the Course Deviation Indicator (CDI) scaling changes during the different phases of the flight.

(h) Each custodian of the IFP must establish procedures for justifying the application of paragraph (c) to an instrument flight procedure.

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(i) Unless it is not practical to do so, the IFP designer must participate in the initial validation flight to assist in its evaluation and obtain direct knowledge of issues related to the procedure's design from the flight validation pilot.

§ 172.59 Crew Requirements.

(a) Flight validations must be performed by qualified and experienced flight validation pilots. The qualifications and experience for flight validation pilots are specified in Appendix B to this part.

(b) The minimum crew of the validation aircraft must be one pilot to validate the IFP and an observer to assist the pilot in the validation process while observing the “out of cockpit” environment. In the case of an aircraft requiring two pilots, one of the pilots may carry out the observer role. It is required that the observer has successfully completed an ICAO PANS-OPS training course, or a training course accepted by the President as an equivalent, for the design and validation of IFP.

(c) Where the procedure to be flight validated is an RNAV (GNSS) IFP of a T- or Y- bar design and is to be manually loaded into the RNAV system, the flight validation pilot must ensure that the observer is fully competent in the use of the RNAV system to be used for the flight.

§ 172.61 Aircraft Requirements.

The aircraft to be used for flight validation of an IFP must have the performance capabilities appropriate to the categories for which the IFP has been designed.

§ 172.63 Meteorological Conditions.

All IFP validation flights must be conducted during daylight hours in visual meteorological conditions (VMC), which allow the flight to be carried out with a flight visibility of not less than 8KM, and in sight of the surface throughout the flight validation of the procedure.

§ 172.65 Navigation Database Validation.

(a) Navigation database validation must be performed for all RNAV instrument flight procedures. Such procedures are coded using ARINC 424 path terminators to define specific nominal tracks, which are defined by waypoint location, waypoint type, and path terminator and, where appropriate, speed constraint, altitude constraint and course.

(b) Navigation database validation must ensure that the coding of the procedure in the RNAV/FMS system does not compromise the flyability of the procedure.

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(c) If the database validation is unable to take place until after the effective date of the IFP, then NOTAM action must be required to delay the effective date.

§ 172.67 Validation Reports.

Where a ground and/or flight and navigation database validation has been conducted, a report must be completed by each of the following where applicable:

- (a) IFP designer;
- (b) IFP flight validating pilot; and
- (c) Relevant ATS unit.

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SUBPART F — APPROVAL OF INSTRUMENT FLIGHT PROCEDURES

§ 172.81 General.

This subpart prescribes the requirements for –

- (a) The design submission that must be submitted by the IFPS provider to the President prior to the approval of each IFP; and
- (b) Formal declarations required to be made by the IFPS provider’s chief designer; and
- (c) IFP approval by the President.

§ 172.83 Requirement for Approval.

Each IFP, including each terminal flight procedure, intended for use by aircraft operating under IFR within the territorial limits of the KSA must be approved by the President.

§ 172.85 Design Submission: General.

- (a) The IFPS provider must prepare and submit to the President a design submission for each IFP for which approval is sought. The submission must conform to the design submission template prescribed in GACAR § 172.87 and Appendix C to this part.
- (b) Each IFPS provider must establish detailed procedures for preparing IFP design submissions as required by this section.

§ 172.87 Design Submission Format and Content.

Each IFP design submission must include the following items in the prescribed format-

(a) *Procedure Designator*. Each IFP must be assigned a unique designator in accordance with procedures prescribed in the relevant ICAO Annexes and Documents.

(b) *Data and Information*.

- (1) All data used in the design process must be submitted in source format as well as any modified formats created during the design process. The data handling process used by the designer must be documented including any quality assurance and quality control processes, procedures and documentation.

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(2) Where any maps or charts have been scanned or digitized such scans or digitized drawings must be included in the submission. It is the responsibility of the IFPS provider to ensure that all relevant data and information is submitted and data handling techniques and routines are subject to appropriate quality assurance and quality control measures.

(3) Data and information must be subdivided into the following main groups:

- (i) Aerodrome data and information
- (ii) Survey data (thresholds, RWY centerline, elevations etc)
- (iii) Aerodrome layout plan
- (iv) GACAR Part 139 obstacle surfaces applicable
- (v) Aerodrome operating certificate including any restrictions and/or conditions
- (vi) Obstacle data
 - (A) Surveyed obstacles
 - (B) Additional obstacles identified
- (vii) Terrain models, if used
- (viii) Any other overlay data used
- (ix) Navaids data and information
 - (A) Survey data of all NAVAIDs
 - (B) Calibration and/or commissioning reports
 - (C) NAVAID information (HOO, DOC, Frequency, Power output etc.)
- (x) Geodetic data and information
 - (A) Survey data on airfield geodetic reference points/monuments

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(B) Local transformation parameters

(C) Local values of “N” Geoidal separation

(xi) Airspace data and information

(xii) Reference to any/all topographical maps used in design

(c) *Drawings.*

(1) All procedure design drawings must be included in the submission. The drawings may be electronic drawing files generated using CAD tool and drawing format acceptable to the President or paper drawings.

(2) Drawings must be structured in such a way that each segment of the procedure can easily be identified and isolated on the drawing.

(3) Obstacles and navigation aids must maintain same numbering and naming convention as used in the survey.

(4) The dominant obstacle for each segment must be clearly marked, identified and referenced to the survey or other data source.

(5) Drawing must be set-up in WGS 84 as a transverse Mercator projection and all set-up parameters must be declared.

(d) *Calculations.*

(1) All calculations and results of calculations must be presented in a manner that enables the President to follow and trace the logic and resultant output. A record of all relevant calculations must be kept in order to prove compliance to or variation from the standard criteria.

(2) The calculation record must be completed enough to prove and substantiate all the elements as required in the content prescribed in Appendix C to this part. Formulae used during calculation must be the standard formulae as declared in ICAO Doc. 8168 Volume II and related ICAO publications.

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(3) Units of measurement and conversion factors must be as prescribed in GACAR Part 2.

(4) Rounding of results must follow the standard guidelines in ICAO Doc. 8168 Volume II and related ICAO publications. Rounding must only be made at the publication stage to facilitate usable figures on maps and charts. Where rounding is required at earlier stages rounding must be made to the pessimistic consideration i.e. Obstacle heights rounded up, speeds rounded up, turn altitudes rounded down etc.

(5) Calculation records must be accompanied by an index and be cross-referenced to the procedures they apply.

(e) *Narratives*. A narrative which describes the IFP in textual format.

(f) *Charts*. A draft chart must reflect in graphic form the content of the narrative provided.

(g) *Design Reports*. A design report giving details of how the requirement has been satisfied and why the eventual procedure has evolved in its proposed form.

(h) *Validation Reports*. All validation reports as required under GACAR § 172.67.

(i) *Declarations*. The chief designer must formally declare using procedures established under GACAR § 172.89 that:

(1) The IFP has been developed, designed, and validated in accordance with the requirements of this part, and the custodian's procedures prescribed in the manual.

(2) The IFP is to be maintained by the IFPS provider in accordance with the custodian's procedures required by Subpart H.

The chief designer must not make declarations concerning an IFP that the person has designed unless the checks required under GACAR § 172.89 have been verified by a qualified designer in the certificate holder's organisation that has not been involved in the design.

§ 172.89 Declaration of Compliance of Instrument Flight Procedures.

(a) Each IFPS provider must establish a detailed procedure for the making of a declaration of compliance of every IFP that the custodian's organization proposes to promulgate.

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(b) The procedure required by paragraph (a) must include details of the checks to be carried out by the chief designer concerning the particular type of IFP, to ensure that the IFP meets the applicable requirements and standards prescribed by this part.

§ 172.91 Approval of Instrument Flight Procedures.

(a) Except as provided in paragraph (b) of this section, before approving an IFP, the President must be satisfied that—

- (1) The IFP has been developed and validated in compliance with the applicable requirements and standards of this part;
- (2) The IFPS provider has made a valid declaration of compliance as required under GACAR § 172.89; and
- (3) The IFP is safe and in the public interest; and
- (4) The IFP will be maintained by an authorized IFPS provider.

(b) Notwithstanding paragraph (a)(1) of this section, when authorized by the President in the certificate holder's operations specifications, an IFP may be developed and validated by a foreign flight procedure design organisation approved by, and in compliance with regulations and standards of, another State.

(c) The President will indicate approval of each IFP in writing.

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SUBPART G — PROMULGATION OF INSTRUMENT FLIGHT PROCEDURES

§ 172.101 General.

- (a) This subpart prescribes the requirements for the promulgation and withdrawal of IFP.
- (b) Each IFPS provider must establish detailed procedures for promulgating and withdrawing IFP as required by this section.

§ 172.103 Promulgation of Instrument Flight Procedures.

An IFPS provider must not promulgate an IFP for use by aircraft operating within the territorial limits of the KSA unless—

- (a) The IFP has been approved by the President in accordance with Subpart F; and
- (b) The details of the IFP are entered in the IFP register in accordance with GACAR § 172.105.

§ 172.105 Instrument Flight Procedure Register.

- (a) Each IFPS provider must establish and maintains an IFP register.
 - (b) The custodian must ensure that each IFP that is approved by the President in accordance with Subpart F will be entered into the IFP register. The register must contain the following information:
 - (1) The name or other appropriate identifier for the IFP:
 - (2) Aeronautical data to define and describe the IFP:
 - (3) The date that the IFP comes into effect; and
 - (4) For private use only IFP, the names of the private persons for whom the IFP is intended to be used.
- (c) Each custodian must notify the GACA SS&AT and each AIS provider authorized under GACAR Part 175 of each amendment to the IFP register. When authorized by the President, approved IFP intended for private use only need not be published in the KSA AIP.

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(d) Each custodian must ensure that any transfer of aeronautical data associated with an IFP, from or to the IFP register complies with the standards specified in the Aeronautical Information Transfer Model (AIXM-5) document or other standards accepted by the President as an equivalent.

(e) When requested, the President may authorize the IFPS provider to integrate the IFP register into the air navigation register that is required to be established and maintained under GACAR § 171.113.

§ 172.107 Withdrawal of Instrument Flight Procedure From Use.

(a) The President must approve, in advance, all withdrawals of an IFP from the IFP register.

(b) Except as provided in (d), each custodian must apply to the President for a withdrawal of an IFP from the IFP register at least 90 days before the intended withdrawal.

(c) If the President approves the withdrawal, the custodian of the IFP must withdraw the IFP from use by—

(1) Issuing a notice to each AIS provider authorized under GACAR Part 175 and any other AIS provider publishing the IFP which will identify the IFP and specify the date that the procedure is to be withdrawn from use;

(2) For private use only IFP, issuing a notice to each authorized user of the IFP which will identify the IFP and specify the date that the procedure is to be withdrawn from use;

(3) On the date of withdrawal, remove the details of the IFP from the IFP register;

(4) Notify the President that the IFP has been withdrawn.

(d) Notwithstanding (b), the President may, by the most appropriate means, withdraw an IFP from use if the President has reasonable grounds to believe that—

(1) The IFP may be unsafe for use by aircraft operating under IFR; or

(2) The IFP is not being maintained in accordance with the applicable requirements of Subpart G.

(e) If the President approves the withdrawal of an IFP from use under paragraphs (c), the President

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will—

- (1) Confirm in writing the withdrawal of the IFP with the custodian of the IFP; and
- (2) Take appropriate action to ensure that the IFP is removed from the KSA AIP and from operational use.

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SUBPART H — MAINTENANCE OF INSTRUMENT FLIGHT PROCEDURES

§ 172.111 General.

This subpart prescribes the requirements for the maintenance of IFP.

§ 172.113 Maintenance of Instrument Flight Procedures.

(a) Each IFPS provider must establish detailed procedures for maintaining every IFP that, in accordance with the statement required under GACAR § 172.87(h)(2), is maintained under the authority of the custodian.

(b) The procedure required by paragraph (a) must include details for every IFP to be reviewed, and flight validated if necessary,—

(1) On a periodic basis, not to exceed five years, ensuring that the IFP continues to meet the applicable standards and requirements of this Part; and

(2) If there is a change in any of the data referred to in GACAR § 172.7(b) that may affect the integrity of the IFP.

(c) The procedure required under paragraph (a) must include and document the grounds and criteria for establishing or changing the interval between the periodic maintenance reviews for each IFP.

§ 172.115 Errors in Published Instrument Flight Procedures.

(a) Each IFPS provider must establish a procedure for recording, investigating, correcting, and reporting to the President any identified error, and any identified nonconformance or suspected nonconformance with the standards and requirements of this part, in an IFP that is maintained under the authority of the custodian.

(b) The procedure required by paragraph (a) must require that—

(1) An IFP is immediately withdrawn from operational use if the error or nonconformance referred to in paragraph (a) affects, or may affect, the safety of an aircraft operation; and

(2) The error or nonconformance is corrected, and declared as compliant with this part by a senior person who is appropriately authorized in accordance with GACAR § 172.23; and

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- (3) The correction required by paragraph (2) is clearly identified and promulgated by the most appropriate means relative to the operational significance of the error or nonconformance; and
- (4) The source of the error or nonconformance is identified, and—
- (i) If possible, eliminated to prevent a recurrence; and
 - (ii) Preventive action is taken to ensure that the source of the error or nonconformance has not affected the integrity of any other IFP; and
- (5) The President is notified, of a promulgated information incident relating to an error or nonconformance referred to in paragraph (a).

§ 172.117 Cessation of Maintenance of an Instrument Flight Procedure.

If the IFPS provider proposes to discontinue the maintenance of an IFP as required by this subpart, the custodian must comply with the requirements prescribed in GACAR § 172.107.

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SUBPART I – QUALITY ASSURANCE

§ 172.131 Quality Assurance.

- (a) Each IFPS provider must establish a quality assurance system to ensure compliance with, and the adequacy of, the procedures required under this part.
- (b) The quality system must incorporate the elements of a flight procedure design quality assurance system as described in ICAO Doc. 9906 and be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards, and certified by an organization acceptable to the President.
- (c) The quality assurance system must include—
- (1) A safety policy and safety policy procedures, including the procedure required under GACAR § 172.115 for investigating errors in promulgated instrument flight procedures;
 - (2) A procedure to ensure quality indicators, including personnel and customer feedback, are monitored to identify existing problems or potential causes of problems within the quality assurance system;
 - (3) A procedure for corrective action to ensure existing problems that have been identified within the quality assurance system are corrected;
 - (4) A procedure for preventive action to ensure that potential causes of problems that have been identified within the quality assurance system are remedied;
 - (5) An internal audit program for the organization to ensure conformity with the procedures in the manual and to achieve the goals set in the safety policy; and
 - (6) Management review procedures, that should include the use of statistical analysis if appropriate, to ensure the continuing suitability and effectiveness of the quality assurance system in satisfying the requirements of this Part.
- (d) The procedure required under paragraph (c)(3) for corrective action must specify how—
- (1) To correct an existing quality problem;

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- (2) To follow up a corrective action to ensure the action is effective;
 - (3) To amend any procedure required under this Part as a result of a corrective action; and
 - (4) Management will measure the effectiveness of any corrective action taken.
- (e) The procedure required under paragraph (c)(4) for preventive action must specify how—
- (1) To correct a potential quality problem;
 - (2) To follow-up a preventive action to ensure the action is effective;
 - (3) To amend any procedure required under this Part as a result of a preventive action; and
 - (4) Management will measure the effectiveness of any preventive action taken.
- (f) The internal audit program required under paragraph (c)(5) must—
- (1) Specify the frequency and location of the audits taking into account the nature of the activity to be audited;
 - (2) Measure the effectiveness of any preventative or corrective action taken by the personnel responsible for the activity being audited since the last audit; and
 - (3) Require preventative or corrective action to be taken by the personnel responsible for the activity being audited if problems are found by the audit.
- (g) The procedure for management review required under paragraph (c)(6) must—
- (1) Specify the frequency of management reviews of the quality assurance system taking into account the need for the continuing effectiveness of the system; and
 - (2) Identify the senior person responsible for the management reviews referred to in paragraph (g)(1).
- (h) The senior person responsible for the quality assurance system must—
- (1) Ensure that the safety policy and the safety policy procedures are understood,

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implemented, and maintained at all levels of the custodian's organization;

(2) Ensure that the audits are performed by trained auditing personnel who are independent of those having direct responsibility for the activity being audited;

(3) Ensure that the results of the audits are reported to the personnel responsible for the activity being audited;

(4) Ensure that all corrective and preventative actions are followed up to review the effectiveness of those actions;

(5) Ensure that the results of the management review are evaluated and recorded; and

(6) Have direct access to the director of instrument flight procedure services on matters affecting the quality of IFP developed, validated, approved, promulgated and maintained under this part.

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SUBPART J – RECORDS AND REPORTS

§ 172.141 Management of Records.

(a) Each IFPS provider must establish a procedure for the management of records that are required for the custodian organization’s functions relating to the design, verification, declaration, registration and maintenance of IFP.

(b) The management of records under paragraph (a) includes the identification, collection, indexing, storage, safekeeping, accessibility, maintenance and disposal of records.

(c) The procedure required by paragraph (a) must provide for the following to be recorded for every IFP that is developed in accordance with Subpart D, validated in accordance with Subpart E, registered in accordance with Subpart G and every instrument flight procedure that is maintained in accordance with Subpart H —

(1) The details required by GACAR § 172.105 for the IFP; and

(2) Details of each IFP design carried out in accordance including but not limited to design verification, amendment, validation, justification for not validating, and declaration activities; and

(3) Details of the promulgation and checking activities; and

(4) Details of any actions taken under GACAR § 172.115 regarding errors and nonconformances in an IFP; and

(5) Details of every maintenance review and flight validation carried out, in accordance with the procedures required by GACAR § 172.113.

(d) The procedure required by paragraph (a) must also provide for the following—

(1) A record, that includes details of the qualifications, experience, training, assessments, and authorizations if applicable, for—

(i) The chief designer required by GACAR § 172.21(a)(2);

;

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(ii) Flight validation pilots required by GACAR § 172.59; and

(iii) Personnel required by GACAR § 172.21(a)(3).

(2) The records required by paragraphs (c) and (d) to be legible, accurate, permanent, and retrievable in a legible format; and

(3) The records required by paragraph (c) must be retained for at least 1 year after the associated IFP is withdrawn from use.

§ 172.143 Promulgated Information Incident Reports.

(a) Each IFPS provider must submit a promulgated information incident report to the President within 24 hours of the promulgated information incident.

(b) The report must include the following information:

(1) Date and time of the incident;

(2) Brief description of events;

(3) Details to identify the publication, map, chart, or other means by which the information or aeronautical data was promulgated;

(4) Details relating to the information or aeronautical data that gave rise to the incident;

(5) Name, organization, and contact details of the person notifying the incident.

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APPENDIX A TO GACAR PART 172 - QUALIFICATION AND EXPERIENCE REQUIREMENTS

I. Chief Designer.

(a) The minimum standard for the qualifications and experience of a chief designer is:

- (1) The qualification and experience requirements of a qualified IFP designer;
- (2) Extensive experience in the design of the type of procedures to be designed and maintained by the certificate holder;
- (3) Satisfactory completion of an advanced course in PANS-OPS procedure design;
- (4) A thorough knowledge of current practices, GACA regulatory requirements, and ICAO standards relating to procedure design;
- (5) A thorough knowledge of the principles of operation of relevant ground and space-based navigation systems;
- (6) A thorough understanding of the operations manual and related systems, including application of the quality and safety management systems of the certificate holder.

(b) The minimum standard of recent experience for acceptance as a chief Designer is:

- (1) Relevant design experience within the previous one year; or
- (2) Satisfactory completion of an approved PANS-OPS procedures design course or an advanced course on PANS-OPS procedure design within the previous two years.

(c) In addition, a chief designer must have at least 10 years' general experience in the application of IFPs through experience gained in air traffic control, as a flight crew member on IFR operations, in operational control of IFR operations, or other experience accepted by the President as equivalent. Experience may include time spent in the design of IFPs.

II. Qualified Designers.

(a) The minimum standard for the qualifications and experience of a qualified designer is:

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- (1) Satisfactory completion of an approved PANS-OPS procedures design course or a training course accepted by the President as an equivalent;
- (2) Satisfactory completion of a course of in-service training in procedures design as detailed in the designer's operations manual;
- (3) Required minimum design experience in accordance with paragraph (c) of this section; and
- (4) A written approval by the chief designer in accordance with paragraph (d) of this section.

(b) In addition, a qualified designer must have at least 5 years' general experience in the application of instrument flight procedures through experience gained in air traffic control, as a flight crew member on IFR operations, in operational control of IFR operations, or other experience accepted by the President as equivalent. Experience may include time spent in the design of IFPs.

(c) *Minimum Design Experience.*

- (1) Minimum design experience is required for each type of procedure to be designed.
- (2) For the purposes of paragraph (a)(3) of this section, the minimum practical design experience required is three designs of a particular procedure type, checked and approved by a chief designer, and completed within any twelve consecutive months.

Note: Once a designer has completed three designs of a particular type as indicated, and provided he has satisfied the other requirements, he may act as a qualified designer – but may only work unsupervised on those IFP types for which he has completed the experience requirement.

(d) *Approvals.* The chief designer must provide each staff member engaged in instrument flight procedure design as a qualified designer with a written statement specifying:

- (1) That the person is a qualified designer;
- (2) The types of procedure that the person is approved to design;
- (3) Any limitations or supervision requirements that apply; and
- (4) Any approval to supervise other design staff.

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III. Apprentice Designers.

(a) Personnel who are not qualified under Section II must not:

- (1) Design a procedure for which approval is required under GACAR Part 172, except under direct supervision; or
- (2) Verify or check a procedure for which approval is required under GACAR Part 172.

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**APPENDIX B TO GACAR PART 172 – REQUIREMENTS FOR FLIGHT
VALIDATION PILOTS**

(a) *Qualifications*. Each IFP flight validation pilot must hold an airline transport pilot certificate issued in accordance with GACAR Part 61 or be otherwise acceptable to the President.

(b) *Training*. Each IFP flight validation pilot must have successfully completed:

(1) An ICAO PANS-OPS training course, or a training course accepted by the President that provides a thorough knowledge of ICAO PANS-OPS procedures design principles and methods related to the design and validation of instrument flight procedures;

(2) A flight validation course conducted by GACA or an organization acceptable to the President and possess a letter of competency issued by President certifying competence to conduct flight validations; and

(3) A course in aerodrome lighting and visual approach slope guidance systems conducted by GACA or an organization acceptable to the President and possess a letter of competency issued by President certifying competence to conduct aerodrome lighting inspections.

(c) *Experience*. Each IFP flight validation pilot must have:

(1) At least 2 years' experience in the flight validations of IFP; and

(2) Completed an IFP flight validation flight within the previous year.

(d) *Rotorcraft*. Rotorcraft IFP procedures must be flight validated by pilots who, in addition to the above qualifications, are certificated in the rotorcraft category and helicopter class rating and are familiar with rotorcraft procedure design and operations. Should the validation pilot not be qualified as pilot-in-command of a helicopter (or other type of aircraft) to be used for a validation flight, another qualified pilot may be assigned to be the pilot in command (PIC) provided the validation pilot occupies either a control seat or a seat in close proximity to the PIC, and directs the conduct of the validation.

(e) Where required by the President, flight validation pilots must also comply with any additional requirements contained in the Quality Assurance Manual for Flight Procedure Design (ICAO Doc. 9906) – Volume 5: Validation of Instrument Flight Procedures, and Volume 6: Flight Validation

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Pilot Training and Evaluation.

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APPENDIX C TO GACAR PART 172 – DESIGN SUBMISSION TEMPLATE

I. The following template prescribes the minimum content of an IFP design submission. The President may specify additional or alternative requirements.

(a) General Section - Common to all IFPs.

- (1) Runway Parameters including magnetic and true direction, variation used, threshold coordinates (WGS 84), convergence used (if using CAD grid), and elevation.
- (2) Navigation aids used including frequency, magnetic variation, DOC, declination, coordinates (WGS 84) and where appropriate whether DME zeroing applies.
- (3) Aerodrome reference point elevation and magnetic variation.
- (4) Airspace (ATZ, CTR, CTA) dimensions.
- (5) Communication frequencies associated with the procedure.
- (6) Purpose of the procedure and most common arrival routes.
- (7) Minimum equipment required for the procedure.
- (8) Any redundancy alternatives considered in the design.

(b) General Section - Relating to specific IFPs:

- (1) A comprehensive design rationale including references to applicable design criteria.
- (2) Reference points for the start and finish of each segment.
- (3) Details of obstacle field including controlling/dominant obstacles for each segment.
- (4) MOC used (primary and secondary areas) and the resultant calculations including allowance for excessive length for each segment as applicable.
- (5) Allowances used for vegetation and buildings.

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- (6) Segment length.
- (7) Details of significant terrain.
- (8) Descent gradient.
- (9) Speeds used.
- (10) Bank angle used.
- (11) Wind velocity used.
- (12) Altitudes (maximum and minimum) per segment.
- (13) Timings.
- (14) Reference navigation aid.
- (15) Fixes (including step down fixes) and the relevant tolerances.
- (16) Tracks, radials, QDRs and QDMs applicable.

(c) In addition to the general requirements prescribed in (a) and (b), the individual requirements for each segment and specific type of flight procedures are listed in the following paragraphs.

- (1) *Holding/Racetrack/Reversal.*
 - (i) Details of the holding facility or fix including tolerances
 - (ii) Inbound track, outbound track
 - (iii) Maximum speed
 - (iv) Maximum altitude
 - (v) Minimum altitude
 - (vi) Outbound limit

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- (vii) Entry procedures
- (viii) Entry sector limitations if restricted joins applicable
- (ix) ICAO template number if used
- (x) Obstacle field
- (xi) Dominant obstacle
- (xii) Published parameters

(2) *Standard Arrival Routes.*

- (i) Segment type and track guidance
- (ii) Reference facilities
- (iii) Track distances
- (iv) Lead radials, and
- (v) Changeover points
- (vi) Step down fixes and minimum altitudes for each section

(3) *Initial Segment.*

- (i) How many and why
- (ii) Type (if a reversal is used confirm type)
- (iii) All the design parameters including the speed, timings, minimum altitude, maximum altitude, inbound timings and/or distances, outbound timing, distances and/or limits, all tolerances used, all offset angles used and template number if used
- (iv) Entry sectors for reversals and racetracks

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- (v) IAF and IF or start of Intermediate segment as applicable
- (vi) Obstacle field applicable
- (vii) Descent gradients and/or rates required
- (viii) Dominant obstacle
- (ix) Published parameters

(4) *Intermediate Segment.*

- (i) IF or start of Intermediate segment
- (ii) Alignment
- (iii) Descent required
- (iv) Proof of provision of a level portion of flight in this segment.
- (v) Segment length
- (vi) Obstacle field
- (vii) Dominant obstacle
- (viii) Maximum altitude
- (ix) Minimum altitude
- (x) Published parameters

(5) *Final Segment - NPA with FAF:*

- (i) FAF and tolerances
- (ii) Alignment and crossing point,
- (iii) Reference facilities

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- (iv) Segment length
- (v) Threshold crossing height
- (vi) Missed Approach Point – how determined (timing, distance)
- (vii) Missed Approach Point tolerances
- (viii) Missed Approach Point distance from threshold
- (ix) SOC parameters
- (x) Obstacle field
- (xi) Dominant obstacle
- (xii) Step down fixes and minimum altitudes
- (xiii) Minimum altitude - OCA(H)
- (xiv) Descent gradient
- (xv) Profile – distance vs. height
- (xvi) Rate of descent required
- (xvii) MOC applied
- (xviii) Published parameters
- (xix) Recommended profile*
- (xx) Timing*
- (xxi) Rate of descent*
- (xxii) Distance from DME to threshold*

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(Note * = If DME available)

(5a) Final Segment - NPA no FAF:

(i) Rate of descent

(ii) Timings

(6) *Precision Segment.*

(i) Final Approach Point

(ii) Basic ILS Surfaces infringements list

(iii) Localizer to threshold distances

(iv) Localizer sector width

(v) Glide path angle

(vi) Missed Approach Point

(vii) Threshold crossing height

(viii) Threshold elevation

(ix) OAS infringement list

(x) CRM including input criteria (*.obs file), and

(xi) OAS coefficients as used unchanged including any adjustments to the relevant constants

(xii) Obstacle field

(xiii) Dominant obstacle

(xiv) OCA(H)

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(xv) SOC

(xvi) Height loss margins applied

(7) *Missed Approach Segment.*

(i) Start of climb

(ii) Climb gradient

(iii) OCA(H) due to missed approach obstacles

(iv) Proof of obstacle clearance to the missed approach obstacle (i.e. nominal altitude greater than required altitude)

(v) Turning point including tolerances (i.e. earliest turning point, latest turning point, minimum turn altitude etc.

(vi) Turn initialization area if turn altitude defined

(vii) Termination point & altitude of the procedure

(viii) All turn parameters (i.e. speed, altitude, temperature, ISA and TAS)

(ix) Textual missed approach instructions

(x) Obstacle field

(xi) Dominant obstacle

(8) *Minimum Sector Altitudes.*

(i) Reference(s) upon which center(s) based

(ii) Sector definitions

(iii) Distance between compound centers

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- (iv) DME subdivisions (if any)
 - (v) Obstacle field
 - (vi) Dominant obstacle for each sector
 - (vii) Published parameters
- (9) *Visual Maneuvering.*
- (i) Altitude
 - (ii) Speeds
 - (iii) Wind velocity
 - (iv) Bank angle
 - (v) Radius of turn
 - (vi) Rate of turn
 - (vii) Straight segment
 - (viii) Circling radius (referenced to ICAO Doc. 8168 PANS-OPS)
 - (ix) Divisions between circling Sectors (where appropriate)
 - (x) Obstacle field
 - (xi) Dominant obstacle for each circling sector