



**AERONAUTICAL SERVICES
ADVISORY MEMORANDUM
(ASAM)
Focal Point: Gen**

ASAM.
No: 017
Issue 3
Date:21.01.15
Page 1 of 9

Title: Guidance Material on Instrument Flight Procedures

1. INTRODUCTION

- 1.1. This guidance material has been prepared to assist those who are involved in construction of Instrument & Visual flight procedures for publication in AIP Ireland. The holding, approach and departure procedures in Ireland are developed in accordance with the specifications contained in ICAO Doc 8168.
- 1.2. The Instrument Flight Procedure Design process encompasses the acquisition of data, design and promulgation of procedures. It starts with compilation and verification of the many inputs and ends with ground and/or flight validation of the finished product, and documentation for publication.
- 1.3. Aerodrome Operating Minima;
 - 1.3.1. The obstacle clearance altitude/heights (OCA/H) for the aircraft categories for which the procedure is designed shall be shown on the relevant instrument approach chart.
 - 1.3.2. The state does not publish visibility, MDA, DH, DA, MDA/H or DA/H for instrument approaches at aerodromes.
- 1.4. Readers should forward advice of errors, inconsistencies, requests for further information or suggestions for improvement to this regulatory requirement to the ansdinfo@iaa.ie

2. REFERENCES

- Doc 8168 - Procedures for Air Navigation Services – Aircraft Operations — Volume I Flight Procedures, and Volume II, Construction of Visual and Instrument Flight Procedures:
- Doc 8697 - Aeronautical Chart Manual:
- Doc 9365 - Manual of All-Weather Operations:
- Doc 9274 – AN/904 Manual on the Use of the Collision Risk Model (CRM) for ILS Operations:
- Doc 9368 – AN/911 Instrument Flight Procedure Construction Manual:
- Doc 9674 – AN/946 World Geodetic System 1984 (WGS-84) Manual:
- Doc 9613 - Performance Based Navigation Manual —Volume I Concept and Implementation Guidance, and Volume II Implementing RNAV and RNP:
- Doc 9881 - Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information:
- Doc 9906 Volume 1
- Doc 9906 Vol 2
- Doc 9906 Vol 4
- Doc 9906 Vol 5
- Doc 9906 Vol 6
- Eurocontrol - NAV.ET.ST10 Guidance material for the Design of Terminal Procedures for Area Navigation:
- ED-77 (RTCA DO-201) Standards for Aeronautical Information:
- Annex 4 - Aeronautical Charts:
- Annex 6 - Operation of Aircraft:
- Annex 11 - Air Traffic Services:
- Annex 14 - Volumes I & II Aerodromes:
- Annex 15 - Aeronautical Information Services
- Annex 19 – Safety Management
- EC Regulation 73/2010



**AERONAUTICAL SERVICES
ADVISORY MEMORANDUM
(ASAM)
Focal Point: Gen**

ASAM.
No: 017
Issue 3
Date:21.01.15
Page 2 of 9

Title: Guidance Material on Instrument Flight Procedures

3. Scope

- 3.1. In designing an instrument approach, simplicity and flyability are the objectives of a good procedure. Keep in mind throughout the process that many aircraft may have only the pilot aboard and complicated procedures could be a hazard. Remembering that transient and tenant aircraft will be using the procedure, as well as primary mission aircraft, may influence the procedure design to some extent.
- 3.2. Throughout the world, unnecessarily complicated instrument procedures have been attributed to causing aircraft accidents. Procedure designers must consider the final procedure design from the viewpoint of the cockpit crew and human factors flight safety.
- 3.3. Flight Procedures considered in this document include;
 - 3.3.1. Conventional
 - 3.3.1.1. IAP's
 - 3.3.1.1.1. Non-precision approach
 - 3.3.1.1.2. Precision approach
 - 3.3.1.2. STAR's
 - 3.3.1.3. SID's
 - 3.3.2. PBN
 - 3.3.2.1. IAP's
 - 3.3.2.1.1. RNP APCH
 - 3.3.2.1.2. RNP AR APCH
 - 3.3.2.1.3. RNP 0.3 (Helicopters)
 - 3.3.2.2. RNAV/RNP STAR's
 - 3.3.2.3. RNAV/RNP SID's

4. Procedure Design Documentation

- 4.1. The applicant shall consult with Pans-Ops & Airspace Inspector, in advance and during the design process, to clarify ICAO, European and National Requirements.
- 4.2. The file (electronic design files, IFP safety assessment, Flight validation, Ground validation for all design files/data and all AIS material in compliance with ICAO, European and National Requirements) shall be submitted to the Pans-Ops & Airspace Inspector for approval at least 40 working days prior to the AIRAC sign-off date (see ASAM 009- Guidance Material on Aeronautical Information Regulation and Control (AIRAC) s).
- 4.3. Documentation required for publication in the AIP in accordance with ICAO Annexes 4 and 15 may be supplied separately to the Pans-Ops & Airspace Inspector once prior consultation has taken place and the documentation is submitted to the Pans-Ops & Airspace Inspector for approval at least 40 working days prior to the AIRAC sign-off date (see ASAM 009- Guidance Material on Aeronautical Information Regulation and Control (AIRAC) s) ;



**AERONAUTICAL SERVICES
ADVISORY MEMORANDUM
(ASAM)
Focal Point: Gen**

ASAM.
No: 017
Issue 3
Date:21.01.15
Page 3 of 9

Title: Guidance Material on Instrument Flight Procedures

4.4. The following documentation (in compliance with ICAO, European and National Requirements) shall be provided all at once by the IFP designer in electronic format including:

4.4.1. documentation required to maintain transparency concerning the details and assumptions used by the IFP designer, which should include supporting information/data used in the design, such as:

- 4.4.1.1. obstacle survey data including dates of last full and update surveys;
- 4.4.1.2. controlling obstacle for each segment of the procedure;
- 4.4.1.3. effect of environmental considerations on the design of the procedure;
- 4.4.1.4. airfield and navigation facility data;
- 4.4.1.5. infrastructure assessment;
- 4.4.1.6. diagram of each segment and holding areas showing dominant obstacles cross referenced to Doc 8168;
- 4.4.1.7. procedural and minimum altitudes for each segment;
- 4.4.1.8. track guidance;
- 4.4.1.9. airspace constraints;
- 4.4.1.10. chart depicting the procedure;
- 4.4.1.11. textual or abbreviated description, path terminators and Aeronautical data base requirements where applicable;
- 4.4.1.12. associated positional data e.g. co-ordinates, bearings, distances;
- 4.4.1.13. description of methodology and options considered;
- 4.4.1.14. for modifications or amendments to existing procedures, the reasons for any changes; and
- 4.4.1.15. For any deviation from existing standards, the reasons for such a deviation and details of the mitigations applied to assure continued safe operations.

4.4.2. Additional documentation received from the ground and flight validation of the procedure.

4.4.3. The IFP design provider shall carry out a safety assessment in respect of proposals for new flight procedure designs or any significant changes in a revised procedure. Proposals shall be implemented only when the assessment has shown that an acceptable level of safety will be met.

4.5. All calculations and results of calculations shall be presented in a manner that enables the reader to follow, trace the logic and resultant output (all calculation cross referenced within the design). A record of all calculations shall be kept in order to prove compliance to or variation from the standard criteria.

4.6. Formulae used during calculation shall be the standard formulae as stated in ICAO Doc 8168 and related ICAO publications. Units of measurement and conversion factors between such units shall be in accordance to ICAO Annexes 4, 5 and 6.



**AERONAUTICAL SERVICES
ADVISORY MEMORANDUM
(ASAM)
Focal Point: Gen**

ASAM.
No: 017
Issue 3
Date:21.01.15
Page 4 of 9

Title: Guidance Material on Instrument Flight Procedures

- 4.7. Rounding of results shall follow the standard guidelines in ICAO Doc 8168 and related ICAO publications. Rounding shall only be made at the publication stage to facilitate usable figures on maps and charts. Where rounding is required at earlier stages rounding shall be made to the pessimistic consideration, i.e. obstacles heights rounded up, speeds rounded up, turn altitudes rounded down etc.
- 4.8. All documentation shall undergo a final verification for accuracy and completeness prior to validation and publication.
- 4.9. All documentation shall be retained to assist in recreating the procedure in the future in the case of incidents and for periodic review and maintenance. The periodic retention shall not be less than the operational lifetime of the procedure.
- 4.10. A separate electronic design file shall be submitted for each chart

5. Requirement for new or updated flight procedures

- 5.1. The applicant shall consult with Pans-Ops & Airspace Inspector, in advance and during the design process, to clarify regulatory requirements.
- 5.2. New Procedures
- 5.2.1. Where an operational requirement exists for a new flight procedure, the Aerodrome operator or the Air Navigation Services Provider (the applicant), as appropriate, shall ensure that such procedure is designed in accordance with the standards outlined (in compliance with ICAO, European and National Requirements) and the entire electronic design file submitted to the Pans-Ops & Airspace Inspector for approval at least 40 working days prior to the AIRAC sign-off date (see ASAM 009- Guidance Material on Aeronautical Information Regulation and Control (AIRAC) s). The Pans-Ops & Airspace Inspector shall issue a written report to the designer with comments and observations.
- 5.2.2.
- 5.3. Revision of Flight Procedures
- 5.3.1. Each flight procedure published in AIP Ireland should be revised as follows:
- 5.3.1.1. when a significant change to the obstacle environment occurs, requiring an amendment of procedural minimum altitudes;
- 5.3.1.2. when a published bearing or bearing, track or radial would fall into error by 1 degree, consequent on a change to magnetic variation or station declination;
- 5.3.1.3. to improve safety or operational efficiency, as identified by an interested party;
- 5.3.1.4. to accommodate changes to aircraft category or characteristics;
- 5.3.1.5. to accommodate route connectivity or airspace organisation change;
- 5.3.1.6. necessitated by changes to the supporting navigation facility environment;
- 5.3.1.7. to comply with amendments to applicable ICAO specifications and other international and national standards and recommended practices;
- 5.3.1.8. where a change in procedural attitude is required;



**AERONAUTICAL SERVICES
ADVISORY MEMORANDUM
(ASAM)
Focal Point: Gen**

ASAM.
No: 017
Issue 3
Date:21.01.15
Page 5 of 9

Title: Guidance Material on Instrument Flight Procedures

- 5.3.1.9. due to errors or anomalies;
- 5.3.1.10. when a significant change occurs to aerodrome physical characteristics such as runways; and
- 5.3.1.11. When any other significant change occurs to aeronautical, cultural or topographical data.

5.3.2. The revised electronic design file shall be submitted to the Pans-Ops & Airspace Inspector for approval at least 40 working days prior to the AIRAC sign-off date (see ASAM 009- Guidance Material on Aeronautical Information Regulation and Control (AIRAC) s).

5.4. Each procedure should be reassessed annually and a revision proposed if necessary.

5.5. A separate electronic design file shall be submitted for each chart

5.6. A full design file shall be required for any new or revised procedure.

6. Competency of Procedure Designer

6.1. In order to ensure that IFP's, submitted to the IAA for approval for publication in AIP Ireland, meet the required standard of quality assurance the proficiency of the designers is specified as follows:

6.1.1. successful completion of a Basic ICAO PANS-OPS course; and/or

6.1.2. successful completion of an Advance ICAO PANS-OPS course; and/or

6.1.3. successful completion of a PBN ICAO PANS-OPS course; and/or

6.1.4. refresher and/or recurrent ICAO Pans-Ops course;

6.1.5. a minimum of five years aviation experience as a pilot, air traffic controller, procedure designer under supervision, or equivalent experience; and,

6.1.6. Completion of a minimum of two approved IFP designs under the supervision of a sponsor or own competence.

6.1.7. The Pans-Ops & Airspace Inspector may request to see the competency based assessment that the designer completed during their last training course.

6.2. Flight procedures submitted for approval should be accompanied by details of qualifying competence of designers.

6.3. Procedure Designers shall be required to undergo Pans-Ops training at least every 3 years. Failure to complete the required training shall result in design files not being accepted/approved for publication within the Irish AIP by the Pans-Ops & Airspace Inspector.

7. Airspace Organisation

7.1. Instrument flight paths should be contained within controlled airspace (Class C within Ireland), where established.

7.2. Where instrument flight paths are contained within controlled airspace which lies above uncontrolled airspace, the minimum procedural altitude should be at least 500ft above the base of controlled airspace.



**AERONAUTICAL SERVICES
ADVISORY MEMORANDUM
(ASAM)
Focal Point: Gen**

ASAM.
No: 017
Issue 3
Date:21.01.15
Page 6 of 9

Title: Guidance Material on Instrument Flight Procedures

7.3. The cascade effect from strategic objectives to the airspace organisation places requirements on the various “enablers”, such as communications, navigation, ATS surveillance, ATM and flight operations. These navigation functionalities are formalized in a navigation specification which, together with a NAVAID infrastructure, supports a particular navigation application. The Procedure designer should ensure that as part of their airspace organisation, navigation applications also have a relationship to communications, ATS surveillance, ATM, ATC tools and flight operations.

8. Flight Procedure Construction Principle

8.1. In addition to the primary consideration of obstacle clearance, principles which should be applied to the design of IFP's are that they should be safe, simple and economic in terms of time and airspace.

8.2. Consistency between different procedures to the same runway should be applied to the extent feasible e.g. harmonisation of platform altitudes and FAFs.

9. Procedure Design Automation

9.1. General

9.1.1. Procedure design automation tools have the potential to reduce errors in the procedure design process, as well as to standardise the application of the PANS-OPS criteria.

9.1.2. Several tools/software automating elementary portions of the procedure design criteria, where the consequences of error are particularly significant to safety are available. A sample of these tools/software are the Obstacle Assessment Surface (OAS) Software and various Pans-Ops Tools/Software, providing a means to evaluate the total risk of impact with an obstacle or the ground on design surfaces.

9.2. Procedural Design Automation

9.2.1. The IFP design provider shall ensure that the software packages used in the design of procedures have been validated (see ICAO Doc 9906 Volume 3). A description of the procedures to be used to ensure that all equipment, including software is operated in accordance with the manufacturer's operating instructions and manuals, shall be made readily available to the IFP designer.

9.2.2. Failure to supply a certificate of tools/software validation may result in the Pans-Ops & Airspace Inspector refusing to allow the design material to be published within the Irish AIP.

10. Quality Assurance

10.1. Use of software

10.1.1. Where practicable calculation and drawing of flight paths and protected areas should be done using accredited validated software.

10.2. Data Processing



**AERONAUTICAL SERVICES
ADVISORY MEMORANDUM
(ASAM)
Focal Point: Gen**

ASAM.
No: 017
Issue 3
Date:21.01.15
Page 7 of 9

Title: Guidance Material on Instrument Flight Procedures

10.2.1. Data processing and transfer techniques shall, where practicable, be based on electronic rather than manual methods. Techniques for deriving positional data shall ensure that accuracy, resolution and integrity of such data complies with ICAO Doc 9674 AN/946 (WGS-84 Manual).

10.3. Survey & Charting Accuracies

10.3.1. Account must be taken of survey and charting accuracies by adding vertical and horizontal tolerances, as determined appropriate.

10.4. Exceptions from PANS-OPS Criteria

10.4.1. Any exceptions from PANS-OPS criteria applied in the procedure construction shall be identified. Such exceptions will require to be considered in conjunction with operators before approval for publication is issued. Only where an identifiable operational advantage can be gained, without compromising safety taking account of the local environment will exceptions to the PANS-OPS criteria be accepted.

10.5. Consultation with User Representatives

10.5.1. The applicant is advised to consult with user representatives, where feasible, before submission of new procedures, particularly where there are complexities in the design. Such consultation may be informal but a note of the outcome may be included with the supporting documentation. During the validation process a determination will be made as to whether formal consultation with user representatives is required;

10.5.2. liaise with the charting provider;

10.5.3. liaise with AIS; and

10.5.4. The Pans-Ops & Airspace Inspector.

11. Ground and Flight Validation

11.1. Validation

11.1.1. Validation is the necessary final quality assurance step in the procedure design process, prior to publication. The purpose of validation is the verification of all obstacle and navigation data, assessment of flyability of the procedure. Validation normally consists of ground validation & flight validation and submitted with all the Instrument Flight Procedure Design Documentation to the Pans-Ops & Airspace Inspector.

11.1.2. Ground validation shall always be undertaken.

11.1.3. When ground validation can verify the accuracy and completeness of all obstacle and navigation data considered in the procedure design, and any other factors normally considered in the flight validation, then the flight validation requirement may be dispensed with.

11.2. Ground Validation

11.2.1. Ground validation is a review of the entire instrument flight procedure package by a person(s) trained in procedure design and with appropriate knowledge of flight validation issues. It is meant to arrest errors in criteria and documentation, and



**AERONAUTICAL SERVICES
ADVISORY MEMORANDUM
(ASAM)
Focal Point: Gen**

ASAM.
No: 017
Issue 3
Date:21.01.15
Page 8 of 9

Title: Guidance Material on Instrument Flight Procedures

evaluate on the ground, to the extent possible, those elements that will be evaluated in a flight validation. Issues identified in the ground validation should be addressed prior to any flight validation.

11.2.2. The ground validation would also determine if flight validation is needed for modifications and amendments to previously published procedures.

11.3. Flight Validation

11.3.1. Flight validation of instrument flight procedures should be carried out as part of the initial record and should also be included as part of the periodic quality assurance programme. It shall be accomplished by a qualified and experienced flight inspector (see ICAO Doc 9906 Volume 6).

11.3.2. The objectives of the flight validation of instrument flight procedures are to:

11.3.2.1. provide assurance that adequate obstacle clearance has been provided;

11.3.2.2. verify that the navigation data to be published has been provided;

11.3.2.3. verify that all required infrastructure, such as runway markings, lighting, and communications and navigation sources, are in place and operative;

11.3.2.4. conduct an assessment of flyability to determine that the procedure can be safely flown; and

11.3.2.5. Evaluate the charting, required infrastructure, visibility and other operational factors.

11.3.3. Flight validation should be apart from flight inspection. Flight inspection of IFP is required to assure that the appropriate radio navigation aids adequately support the procedure. This is carried out as part of a formal flight inspection programme and is performed by a qualified flight inspector using an appropriately equipped aircraft.

11.3.4. The IFP designer shall be the originator of all data applicable to conduct a flight validation provided to the flight validation operations activity. The IFP designer should be prepared to provide briefings to the flight validation crews in those cases where flight procedures have unique application or special features.

11.3.5. The IFP designer may 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 and/or inspector.

12. Safety Assessment

12.1. Safety Assessment

12.1.1. The IFP design provider shall carry out a safety assessment in respect of proposals for new flight procedure designs or any significant changes in a revised procedure. IFP's shall be implemented only when the assessment has shown that an acceptable level of safety will be met.

12.1.2. The safety assessment shall consider relevant factors determined to be safety-significant, including but not limited to:



**AERONAUTICAL SERVICES
ADVISORY MEMORANDUM
(ASAM)
Focal Point: Gen**

ASAM.
No: 017
Issue 3
Date:21.01.15
Page 9 of 9

Title: Guidance Material on Instrument Flight Procedures

- 12.1.2.1. types of aircraft and their performance characteristics, including navigation capabilities and navigation performance;
 - 12.1.2.2. traffic density and distribution;
 - 12.1.2.3. airspace complexity; ATS route structure and classification of the airspace;
 - 12.1.2.4. aerodrome layout
 - 12.1.2.5. type and capabilities of ground navigation systems; and
 - 12.1.2.6. Any significant local or regional data's (e.g. obstacles, infrastructures, operational factors, etc.).
- 12.1.3. Safety risk control/mitigation process shall include hazard/consequence identification and safety risk assessment. Once hazards and consequences have been identified and safety risks assessed, the effectiveness and efficiency of existing aviation system defences relative to the hazards and consequences should be evaluated. As a consequence of this evaluation, existing defences shall be reinforced, new ones introduced, or both.
- 12.1.4. As part of the safety assurance, the risk control/ mitigation process shall include a system of feedback. This is to ensure integrity, efficiency and effectiveness of the defences under the new operational conditions.
- 12.1.5. The IFP design provider shall ensure that the results and conclusions of the safety assessment and mitigation process of a new or changed procedure are specifically documented submitted with all the Instrument Flight Procedure Design Documentation to the Pans-Ops & Airspace Inspector and that this documentation is maintained throughout the life of the instrument flight procedure.

This replaces ASAM No.017 “Guidance Material on Instrument Flight Procedure Design”, Issue 1, Date: 09.03.10

ASAM No.017 “Guidance Material on Instrument Flight Procedure Design”, Issue 1, Date: 09.03.10 is hereby cancelled