IFR ARRIVAL AND APPROACH PROCEDURE

INTRODUCTION

An instrument approach procedure is a series of predetermined manoeuvres by reference to flight instruments.

The design of an approach procedure is, in general, dictated by the terrain surrounding the airfield, the type of operation contemplated and the aircraft to be accommodated.

DEFINITION

An Instrument approach procedure (IAP) is a series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply.

Instrument approach procedures are classified as follows:

- **Non-precision approach (NPA) procedure**: An instrument approach procedure designed for 2D instrument approach operations Type A.
- **Approach procedure with vertical guidance (APV)**: A performance-based navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A.
- **Precision approach (PA) procedure**: An instrument approach procedure based on navigation systems (ILS, MLS, GLS and SBAS CAT I) designed for 3D instrument approach operations Type A or B.

There are two methods for executing instrument approach operations:

- a two-dimensional (2D) instrument approach operation, using lateral navigation guidance only;
- a three-dimensional (3D) instrument approach operation, using both lateral and vertical navigation guidance.

Instrument approach operations include an instrument phase and a visual phase:

- The instrument phase ends at the published MDA/H or DA/H unless a missed approach is initiated.
- The continued approach to landing from MDA/H or DA/H will be conducted using visual references.

Lateral and vertical navigation guidance refers to the guidance provided either by:

- a ground-based radio navigation aid
- computer-generated navigation data from ground-based, space-based, self-contained navigation aids or a combination of these.
Consult the document that describe the IFR precision approach and minima in order to have more information.

The operator shall establish operational procedures designed to ensure that an aeroplane being used to conduct 3D instrument approach operations crosses the threshold by a safe margin, with the aeroplane in the landing configuration and attitude.

CATEGORIES OF AIRCRAFT FOR APPROACH PROCEDURES

Aircraft performance has a direct effect on the airspace and visibility required for the various manoeuvres associated with the conduct of instrument approach procedures. The most significant performance factor is aircraft speed.

Accordingly, categories of aircraft have been established. These categories provide a standardized basis for relating aircraft manoeuvrability to specific instrument approach procedures.

The criteria chosen for establishing this classification of aircraft categories is the indicated airspeed at threshold $V_{at}$ in the landing configuration (flaps, gear) at the maximum certificated mass.

The table which describe the category list in function of $V_{at}$ can be consulted in the article : Category of aircraft for approach procedures

$$V_{at} = V_{SO} \times 1.3 \quad \text{or} \quad V_{at} = V_{S1G} \times 1.23 \quad (V_{SO} \quad \text{or} \quad V_{S1G} \text{ are reference stall speeds})$$

OBSTACLE CLEARANCE

The obstacle clearance is a primary safety consideration in the development of instrument approach procedures. The obstacle clearance applied in each instrument approach procedure is considered to be the minimum required for an acceptable level of safety in operation.

For each individual approach procedure, an obstacle clearance altitude/height OCA/H is published on the instrument approach chart for each applicable category of aircraft.

The OCA/H is:

- In a precision approach procedure, the lowest altitude (OCA) above the elevation of the relevant runway threshold at which a missed approach must be initiated.
- In a non-precision approach procedure, the lowest altitude (OCA) above the aerodrome elevation or the elevation of the relevant runway threshold, if the threshold elevation is more than 2m (7ft) below the aerodrome elevation (OCH) below which an aircraft cannot descend without infringing the appropriate obstacle clearance criteria.
In a visual (circling) procedure, the altitude (OCA) above the aerodrome elevation below which an aircraft cannot descend without infringing the appropriate obstacle clearance criteria.

In general, minima are developed by adding the effect of a number of operational factors to OCA/H to produce:

- Decision altitude (DA) or decision height (DH) for precision approach
- Minimum descent altitude (MDA) or minimum descent height (MDH) for non-precision approach

### SPEED RANGE FOR PROCEDURE CALCULATION

The procedures and the tracks protection are constructed using a predefined speed range depending on the localization inside the approach tracks.

The speed ranges are described in the article: Category of aircraft for approach procedures

### SEGMENTS OF APPROACH PROCEDURE

An approach procedure may have up to 5 separate segments:

1. Arrival segment
2. Initial approach segment
3. Intermediate approach segment
4. Final approach segment
5. Missed approach segment

In addition, an area for circling the aerodrome under visual conditions is also considered. Be aware that in some procedures we can have less than 5 separate segments.

These approach segments begin and end at designated fixes or specified points where no fixes are available.

Definition:

**IAF** = initial approach fix is a fix that marks the beginning of the initial segment and the end of the arrival segment, if applicable. In RNAV application, this fix is normally defined by a fly-by waypoint.

**IF** = intermediate fix is a fix that marks the end of an initial segment and the beginning of the intermediate segment. In RNAV application, this fix is normally defined by a fly-by waypoint.

**FAF** = final approach fix is a fix that marks the end of an intermediate segment and the beginning of the final approach segment for non-precision approach.

**FAP** = final approach point is a fix that marks the end of an intermediate segment and the beginning of the final approach segment for precision approach.

**MAPt** = Missed approach point is a point in an instrument approach procedure at or before which the prescribed missed approach procedure must be initiated in order to ensure that the minimum obstacle clearance is not infringed.
DA = A specified altitude or height in a 3D instrument approach operation at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

MDA = A specified altitude or height in a 2D instrument approach operation or circling approach operation below which descent must not be made without the required visual reference.

MAHF = Missed approach holding fix is a fix used in RNAV application that marks the end of the missed approach segment and the centre point for the missed approach holding.

MSA = Minimum sector altitude is the lowest altitude which may be used which will provide a minimum clearance of 300m (1000ft) above all objects located in an area contained within a sector of a circle of 46km (25NM) radius centred on a radio aid to navigation.

**SEE ALSO**
- IFR precision approach and minima
- Category of aircraft for approach procedures

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