

UNIT 7 - AIR NAVIGATION

RADIO NAVIGATION

ILS – INSTRUMENT LANDING SYSTEM

Depending on the aircraft equipment, each dot of deviation on the LOC represents $\pm 0.8^\circ$ deviation and each dot on the GS equals $\pm 0.4^\circ$ deviation. The system can also have a DME associated to give distance information.

The ILS has three different categories of approach: CAT I, II and III – the last two categories form part of low visibility approaches where you have an autoland capability, these operations are called Low Visibility Operations (LVO).

In order to carry these out, the crew must be qualified and the aircraft and ground based equipment must be certified.

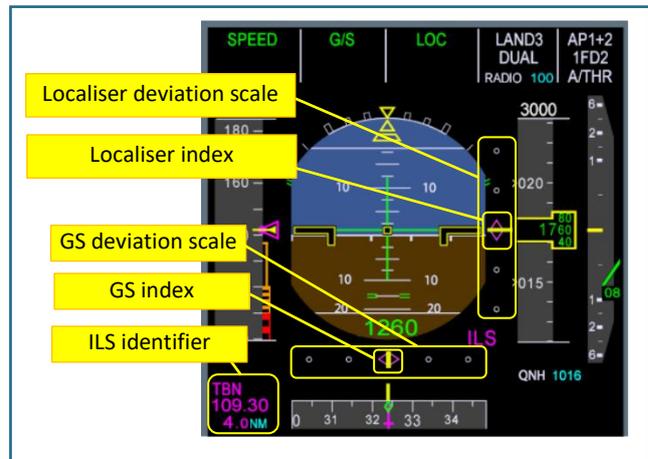


Figure 5 - Primary Flight Display with ILS (Source: Airbus)

A CAT I approach is the least restrictive and does not require special training other than a standard Instrument Rating. However, in order to conduct a CAT II and CAT III approach, the crew must be specially trained in order to takeoff and land in low visibility and carried out during recurrent simulator training and checking.

A CAT II approach is classified as a LVO approach and has lower minima than the CAT I.

CAT III is divided into two sub-categories, namely CAT III A and CAT III B. These categories depend on the aircraft equipment, airfield facility and the backup power systems available in order to protect the integrity and quality of signal transmission.

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Below is a table of the different categories of ILS and their minima:

| Category | Decision Height (feet) | Runway Visual Range (RVR) or visibility in metres |
|-----------|------------------------|---|
| CAT I | > 200ft | RVR > 550 m or visibility > 800m |
| CAT II | 100-200ft | ICAO: RVR > 350 m, FAA/EASA: RVR > 300m |
| CAT III A | < 100ft | RVR > 200 m |
| CAT III B | < 50ft | ICAO/FAA: 50-200 m; EASA: 75-200 m |

PBN – PERFORMANCE BASED NAVIGATION

For example, RNP 0.1 means the on-board aircraft navigation system must be able to calculate its position to within a circle with a radius of 1/10 of a NM, similarly RNP 5 is to within 5 NM. The smaller the number, the more stringent the navigation requirement.

In as far as qualifications, all flight crew initial and recurrent training includes PBN (RNAV and RNP) operations. In Europe, this is now included in all standard instrument ratings that include PBN privileges.

The only type of difference where operator approval is required is called the RNP (AR) Approach – Authorisation Required. These are very demanding PBN operations in mountainous areas where the vertical and lateral accuracy in turns can be as low as ± 0.1 NM.

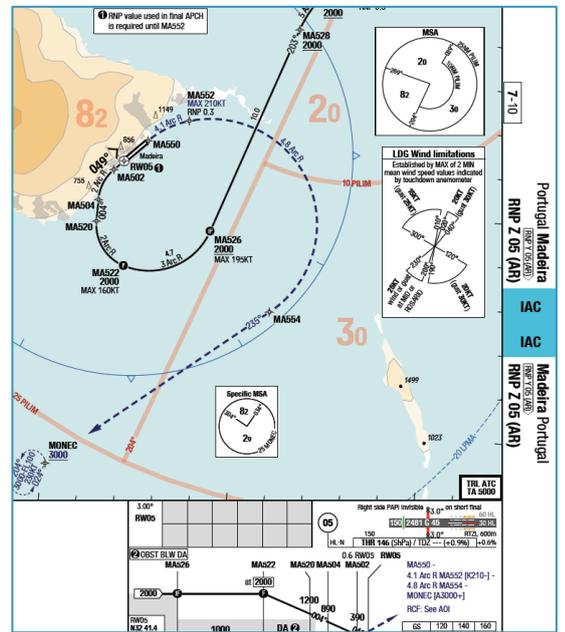


Figure 6 - RNP AR Approach (Source: LIDO eRM)

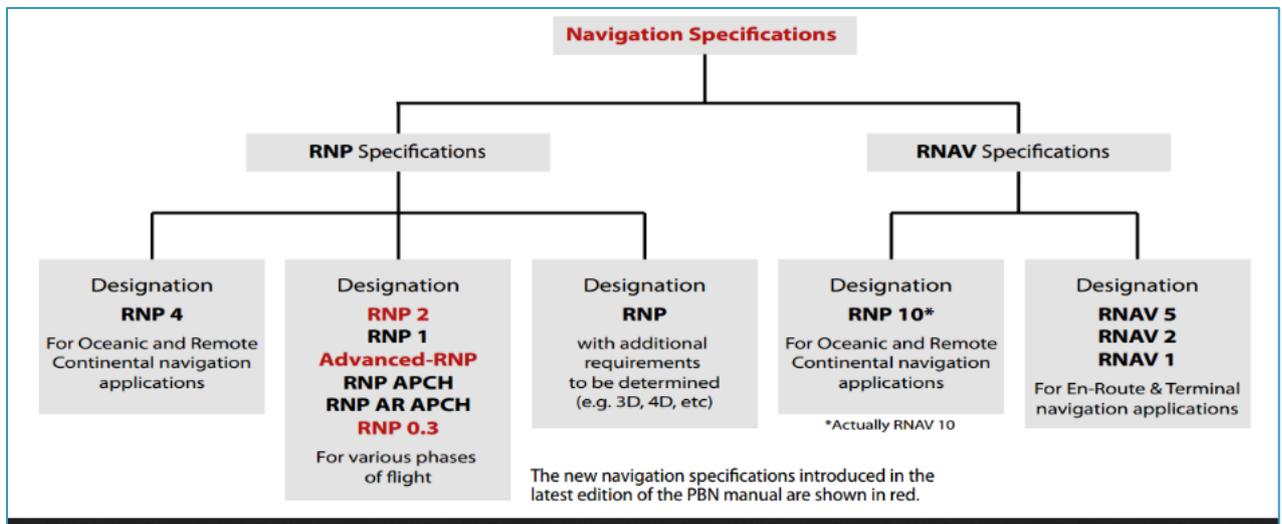


Figure 7 - RNP and RNAV Specifications.