# Instrumental Flight Procedures (GNSS based) to Non Instrument Runways

Carmen Aguilera, European GNSS Agency (GSA)

Jose Maria Lorenzo, European Satellite Services Provider (ESSP)

Chris Neville, European GNSS Agency (GSA)

The following document provides an assessment of the current operational requirements to perform RNP APCH operations down to Localizer Performance with Vertical guidance (LPV) on small Aerodromes, without the need to upgrade runway infrastructure.

This document provides a view on the current implementation solutions in different EU countries and based on EASA RMT developments, identifies the gaps on the implementation process that would need to be modify in order to set a proportionate scenario for General Aviation IFP implementation. It has been prepared by European Satellite Services Provider S.A.S. (ESSP SAS) under its EGNOS Service Provision contract with the European Global Navigation Satellite Systems Agency (GSA).



**Released**: October 2017

# Table of Contents

# 1 INTRODUCTION

General Aviation market conducts millions of operations with a fleet equipped with GNSS-receivers demanding to benefit from the new aviation technologies. EU regulation has opened the door to enhance safety of small VFR AD with a low-cost implementation process for instrumental flight operations. This document addresses the implementation process, analysing the existing regulatory scenario and best practices in EU countries.

**EASA Approach to General Aviation**

EASA efforts are intended to enhance the safety of General Aviation operations with one of the focus set on the introduction of IFR operations. Adoption of new ICAO classification is the main enabler for GNSS-based approach implementation, but other EASA RMT, deeply analysed and conclusions extracted during the document, are also part of this changing process. These regulatory initiatives are driven to have more proportionate requirements tailored to GA needs and covering all EASA domains, from licensing to ATS or AD infrastructure.

EASA efforts have produced major progress on airworthiness and pilot licensing in General Aviation, with a proposal for a light Part-M, CS-STAN in airworthiness, Single Engine Turbines for IMC in OPS and Basic Instrument Rating and Declared Training Organizations in Pilot licensing. This will ease IFR implementations for sure, but nevertheless, ATM and Aerodrome frames are not fully afforded to also set proportionate requirements to enable GA instrumental operations.

*Figure 1 EASA GA Roadmap*

RMT.0677 ToR Easier access of General Aviation (GA) pilots to instrument flight rules (IFR) flying quotes:

*"In this context, it is expected that the comprehensive action plan will contain recommendations for changes of the aircrew, airworthiness, ATM, and aerodrome, etc. requirements".*

But this is still missing. This initiative contributes to meet this objective, highlighting those RMTs which can be relevant for the implementation of IFR for General Aviation tackling the missing points and proposing solutions. The solutions proposed are to be further discussed and defined wherever feasible by the GA community (ideally within EASA remits) shall conclude on the development of a 'Practical Guide' to enable the use of GNSS-based operations for GA at VFR locations.

The most representative EASA RMTs involved in the implementation process which can be relevant for the purpose of this document are as follows, along with the implementation roadmap:

- **RMT.0591** Maintaining **ADR** rules. Introduces new ICAO RWY classification.
- **RMT.0719:** Regular update of **ATM/ANS** rules.
- **RMT.0464**: Requirements for **Air Traffic services** (introduces **UNICOM** services).
- **RMT.0477:** Technical requirements and operational procedures for **AIS and AIM** (new AIS certificate).
- **RMT.0455** Technical requirements and operational procedures for airspace design including **flight procedure design.**
- **RMT.0657** Easier access of General Aviation (GA) pilots to instrument flight rules (IFR). **Introduces BIR and DTO**.

# 2 CONCEPT VIEW. GNSS-BASED INSTRUMENTAL OPERATIONS FOR GENERAL AVIATION

Based on the best practices used on USA and other EU countries jointly with EASA rulemaking developments, the following concept gives a theorical example of how to perform instrumental approaches at non-controlled Aerodromes.

The main difference between operating at an aerodrome with ATC or non-controlled is the difference about instructions or advisories. ATC issue clearance, taxi or arrival instructions on specific ATC frequencies, meanwhile at non-towered AD, advisories are transmitted through a dedicated frequency (UNICOM, not ATS), but the responsibility for traffic separation, sequencing or knowing the local procedures falls on the pilot on board.

The objective of this section is to show a full GA scenario mixing all the elements, to provide an example of an operation that tackles all relevant points and can be used as a starting point to define the missing gaps..

Our scenario is composed by an aircraft equipped with a certified GNSS-receiver (ETSO-145/146, i.e. Garmin GTN750) and a pilot holding a Basic Instrument Rating (BIR), which enables the use of instrumental approaches with a limit on the operating minima of the approach down to 500ft.

The aircraft enters in the airport vicinity airspace Class E (until 1000ft AGL), and asks for an ATC clearance to perform an instrumental RNP APCH (with SBAS-based vertical guidance, down to LPV minima) from the designated APP unit. This airspace limit Class E allows the aircraft to be controlled the most part of the flight, reducing the non-controlled operation to 3NM of the final approach segment.

The AD has a non-instrument RWY available, with an instrumental approach procedure (RNP APCH) published on its national AIP jointly with the info about the services available on its location, namely an APP and UNICOM frequency or the source of MET information. MET info needed for the approach can be obtained from automated MET systems (AWOS/ASOS), or by a near MET station, properly published on AIP info.

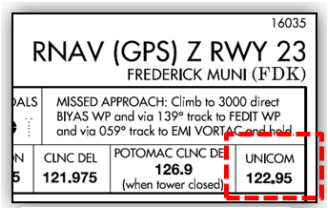
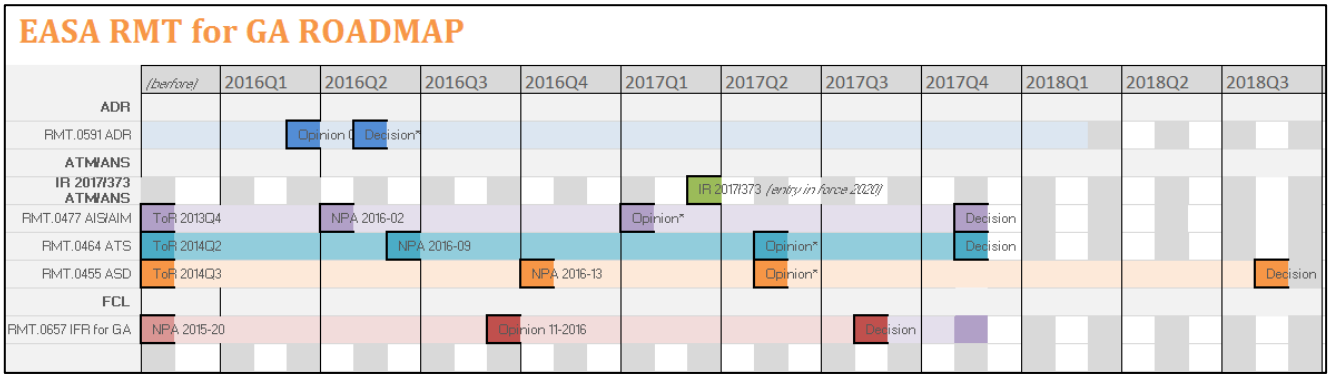



*Figure 2 FDK AD (USA)*




Following the principle 'one in, one out' only one aircraft is cleared to enter on the vicinity of the AD, determined by a RMZ Class G. This ensures that the airspace is free of IFR flights, but no separation from IFR/VFR aircraft is provided, so pilots shall separate themselves. To contact other airspace users, pilot uses the UNICOM frequency, self-announcing to the surrounding traffic their position and its landing intentions, even with blind messages. To end the approach, the pilot finishes the procedure in VMC,

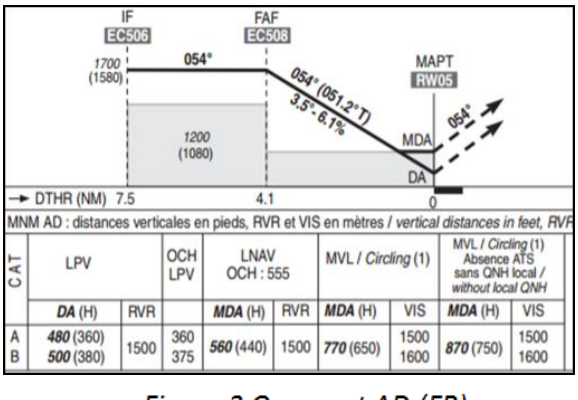



*Figure 3 Ouessant AD (FR)*

integrating the aircraft into the visual approach circling circuit.

Once safely on the ground, the aircraft is required to contact ATC or AFIS via the phone or radio to close the IFR flight plan, leaving the airspace free for other users to conduct a new IFR approach.

# 3 REGULATORY ANALYSIS OF IAP IMPLEMENTATION PROCESS FOR GENERAL AVIATION.

After the analysis of the results of EASA rulemaking tasks there are relevant aspects regarding the implementation of GNSS-based operations at small AD involving almost every area. Some of them are already clear, but other aspects may need further clarifications. This section summarizes the most representative ones, to identify the gaps or potential barriers of IFR operations implementation for GA including a view of how to solve them when feasible, being aware that further EASA developments could change the presented understanding.

After each subsection the implementation solution available **(in blue)** and the activities arisen to solve the existing barriers or improve the implementation frame **(in orange)** are also highlighted.

## 3.1 Aerodromes

ESSP has performed a high-level market assessment to value the number of potential aerodromes across Europe that features the AD scenario for GA. Main conclusions drawn from the analysis are:

- There are around 5300 non-instrumental runway ends at EU28 scope (2673 airports).
- Most of these airports are serving private traffic (note that the BA/GA segment is the segment best fitted for SBAS nowadays).
- Most non-instrumental runways are located in Germany, France, UK and Italy, representing almost 75% of the airports.

EASA each year also provides a list of AD under the scope of CR 139/2014 [RD-3], following the statement in Article 4: *Information to the European Aviation Safety Agency* https://www.easa.europa.eu/system/files/dfu/List%20of%20EASA%20ADRs-Art%204%20%26%205.pdf

This list compiles also the AD expected to ask for an exemption due to traffic expected providing info about the Aerodrome operator.

**Basic Regulation application to Aerodromes**

The Aerodromes to which EASA Regulation applies are defined in Article 4.3a (Basic Regulation (EC) 216/2008 [RD-2]) as follows:

*<<Aerodromes, including equipment, located in the territory subject to the provisions of the Treaty, open to public use **and** which serve commercial air transport **and** where operations using instrument approach or departure procedures are provided, and:*

*(a) have a paved runway of 800 metres or above; or*

*(b) exclusively serve helicopters; >>*

Nevertheless, in Article 4.3b of the same Regulation some derogation may be applied: subject to local arrangements.

*<<By way of derogation from paragraph 3a, Member States may decide to exempt from the provisions of this Regulation an aerodrome which: handles no more than 10 000 passengers per year, and handles no more than 850 movements related to cargo operations per year. >>*

Aerodromes operating under VFR typically do not serve commercial air transport, so most of small aerodromes are out of EASA Regulatory scope. This situation leads to local solutions which will probably not be homogenous.

With the introduction of ICAO new RWY classification and definitions, instrumental procedures are considered to be implemented in any runways type, and therefore this could lead to a potential increase on the number of aerodromes under the scope of EASA basic regulation.

This document based on EASA RMT developments tries to be a supportive documentation for the homogenous application of LPV procedures in EASA and non-EASA aerodromes. The aim is to build a common proportionate approach aligned with EASA

criteria useful also to comply with EU national level regulation.

**Runway requirements**

> ***"non-instrument runway" -*** *a runway intended for the operation of aircraft using visual approach procedures or* ***an instrument approach procedure to a point beyond which*** *the approach may continue in visual meteorological conditions.*

According to new ICAO RWY classification referred in ICAO Annex 14 [RD-4], IFP can be implemented at non-instrument RWY, so there is no additional requirement in terms of RWY infrastructure is needed to implement RNP APCH. This definition is expected to be adopted at EU level by CR. 139/2004 (ADR) [RD-3] in 2016 Q2[1]

To reinforce this understanding EASA Opinion 03-2016 [RD-16] quotes in its *Executive Summary*:

> "The specific objective of this Opinion is to maintain and, for specific types of runways (non-instrument and non-precision), enhance the high level of safety. It facilitates performance-based navigation approach operations with vertical guidance to be applied at non-precision approach runways, and instrument approach operations to be associated with non-instrument runways **without the need** in both cases **to upgrade runway infrastructure**"

**Lighting requirements**

Runway lights are not mandatory for a runway intended for use during day-time[2] (unless it is a precision approach runway). The class of lighting facilities available at the RWY does not have impact on the minima DH achievable, it has an impact on the RVR needed to operate at the AD.

RVR values range from 600m to 1300m for a DH=250ft *(AMC5 CAT.OP.MPA.110, Aerodrome operating minima, Table 5, [RD-11]).*

**Obstacle Limitation Surfaces**

Implementing RNP APCH procedures down to LPV minima at non-instrument RWY does not introduce additional requirements. The ICAO Annex 14 OLS (included in EU Reg 139/2004 Part ADR [RD-4]) are different depending on the runway classification (non-instrument, non-precision and precision) and runway code number, but it not depends whether there are Instrumental procedures implemented.

**Implementation solution:**

- No upgrade on runway infrastructure is needed
- There is no additional lighting system requirements.
- There is no additional OLS requirements.

All RWY types (instrument or non-instrument) can implement IFR operations

*PBN based solutions with vertical guidance are highly recommended (3D approach type A)*

**ADR certificate**

GM1.ADR.AR.C.035 includes EASA form for ADR certificate (EASA Form 157 Service Provider Certificate, [RD-12]).

With the adoption of new ICAO RWY classification, IFP are allowed at non-instrument RWYs, so the terms of an existing certificate shall be modified to include IFR flights:

- Note 3, conditions to operate: IFR.
- Note 5, type of approaches.

Users experience shows that the process to modify the conditions of an existing certificate is usually difficult, constituting a barrier to IFR implementation (feedback provided by European Regional Aerodromes Community).

**Practical guide to CAA and AD operators** on safety implications of the change from VFR to IFR in order to upgrade the ADR certificate and any mitigation mean needed could help to make the process easier.

[1] At the time of the present document the provisions have not been implemented.

[2] Lighting systems for night operation are not always mandatory: CS ADR-DSN.M.625 Approach lighting systems:

*Non-instrument runway Applicability: Where physically practicable, a simple approach lighting system as specified in CS ADR-DSN.M.626 should be provided to serve a non-instrument runway where the code number is 3 or 4, and intended for use at night, except when the runway is used only in conditions of good visibility, and sufficient guidance is provided by other visual aids.*

**Implementation solution:**

A change on ADR certificate (EASA Form 157 Service Provider Certificate) is needed to introduce IFR operations

**…still work to do:**

Develop a practical guide with the steps and docs needed to change an ADR certificate including IFR operations.

## 3.2 ATS level

To determine the level of ATS to serve instrumental operations at an AD, an assessment considering the local conditions shall be issued. According to ICAO Annex 11[RD-6] and the incoming Part-ATS [RD-13], this assessment shall consider:

- The nature and density of the traffic sample expected to operate at the AD.
- The metrological conditions and its influence on the flow of air traffic.
- The geographical conditions of the AD surroundings.
- The complexity of the airspace concerned.

For the purpose of implementing instrument procedures at an aerodrome, the following options are considered from more to less demanding:

- Air Traffic Control service (ATC).
- Flight Information Service in an aerodrome (AFIS, certified or declared, when only a position is open).
- ATS (ATC/AFIS) with a limited certificate.
- No ATC/AFIS.

Implementing ATC or AFIS may result in a non-positive business case in many small aerodromes with low traffic. Therefore, the case that is preferred at small aerodromes with low level of traffic is no ATC nor AFIS but separation ensured by pilot communications reporting their positions and intentions (UNICOM). AFIS holding a limited certificate is also considered as a proportional ATS level for GA.

**Implementation solution:**

AFIS (with or without a limited certificate, subject to EASA/SES rules) and UNICOM (no ATS considered, national level) are tailored ATS solutions for GA.

### ATS with limited certificate

A limited certificate is a figure intended for small service providers, to allow having more proportionate requirements to comply with ATM/ATS requirements. It is not available for all SP, only for ANSP (ATS, MET, AIS, CNS).

IR 373/2017 [RD-13] introduces a new approach to apply for a limited certificate from 1035/2011, with some relevant differences. IR 1035/2011 [RD-14] set limited certificates (Art.5) as a derogation granted by the competent authority of the existing requirements, setting the responsibility of maintaining the safety level on Member States. IR 2017/373 [RD-13] changes the point of view, now a limited certificate is a figure part of common requirements, ANSP do not obtain a limited certificate by the derogation of some articles, but complying with ATM/ANS.OR.A.010. This slightly difference could enable the use of limited certificates for small ANSP through EU.

The scope of ANSP that could apply for a limited certificate does not change, small entities providing services at locations with low traffic:

- ATSP planning to provide its services for:
  - Aerial work
  - General Aviation
  - Comercial Air transport MTOM<10tonnes or <20 pax
- ANSP:
  - With a gross annual turnover of less than EUR 1 000 000
  - Providing FIS with not more than one position at any AD

ANSP with a limited certificate are not required to comply with the whole Annex IV, only the applicable provisions listed on ATM/ANS.OR.010:

*(1) point ATM/ANS.OR.B.001 Technical and operational competence and capability;*

*(2) point ATM/ANS.OR.B.005 Management system;*

*(3) point ATM/ANS.OR.B.020 Personnel requirements;*

*(4) point ATM/ANS.OR.A.075 Open and transparent provision of services;*

*(5) Annexes IV, V, VI and VIII, where those requirements are applicable*

There are significant absences which require an effort for small ANSP like change management (ATM.ANS.OR.A.045,045; ATM.ANS.OR.B.010), occurrence reporting (ATM.ANS.OR.A.065), contingency plans (ATM.ANS.OR.A.070), Operations Manual (ATM.ANS.OR.B.035) or liabilities and insurance cover (ATM.ANS.OR.D.020).

**UNICOM**

NPA 2016-09 [RD-18] introduces UNICOM service. **UNICOM is another feasible solution for non-towered aerodromes, designed to fill the gap between AFIS and no aerodrome service at all.**

This service comprises a frequency used by pilots to announce their intentions at an aerodrome where ATS are not provided. It must be emphasised that a UNICOM service is not an air traffic service, meaning that pilots must accept more responsibility for their actions than when operating in a controlled aerodrome environment. As a reference, in some countries such as USA or Australia, this service is provided and a UNICOM frequency is clearly stated in the approach chart.

UNICOM definition is out of EASA competences, and each MS shall set the frame for its provision. The lack of guidance to implement this new figure could lead to a non-harmonized scenario and constitutes a barrier to its implementation.

**…still work to do:**

UNICOM service is not defined in EU, and EASA has determined it is out of its scope. There is no guidance on:

- Common EU frequency and language to be used.
- Operational procedures when there is no UNICOM service available (blind messages)
- Personnel requirements for UNICOM officers:
  - Basic aeronautical training
  - Info to be provided (RWY status, weather info, navaid status/NOTMAs and advisory traffic information when available)
  - Responsibilities (none, only info is provided, pilots are the responsible of the operation)

The needed **formal agreements** to ensure liabilities with other SPs in the case of UNICOM or ATS with limited certificate could be ensured by the AD operator. Aerodrome operators holding a certificate follow a similar scheme than ATS providers, having similar provisions driven to ensure the safety of the operation. Reg 139/2014 [RD-12] also sets the responsibility for AD operators to coordinate with the ANS needed for the operation:

*ADR.OR.C.005 Aerodrome operator responsibilities*

*(b) The aerodrome operator shall **ensure directly**, or **coordinate through arrangements as required with the accountable entities providing** the following services:*

*(1) **the provision of air navigation services** appropriate to the level of traffic and the operating conditions at the aerodrome; and*

*(2) the design and maintenance of the flight procedures, in accordance with the applicable requirements*

For those aerodromes out of Reg. 139/2014 [RD-12] it is expected that a similar framework exists at State level, and therefore this approach though maybe not fully exportable, can easily be considered and promoted as best practices.

**Implementation solution:**

Aerodrome Operator shall lead the required formal agreements with ANS providers (MET, CNS, AIS) in case the ATS level available is an AFIS with limited certificate or UNICOM service implemented

**…still work to do:**

Develop templates of formal agreements to be signed by an AD operator with other service providers involved on the operation, i.e. with AFIS, EGNOS provider, AIS provider, MET provider.

**…still work to do:**

Could an AD operator holding an EASA certificate ask for an ATS (AFIS) limited certificate? Synergies and advantages of adapting an existing certified SMS.

*Comments: Is this figure valuable for GA community?*

## 3.3 Aeronautical Information Service (AIS)

**Publication**

According to ICAO Annex 15 [RD-7], (and EASA NPA 2016-02 [RD-19]), ICAO Instrument Approach

Charts shall be published on national AIP, but only for AD used by international civil aviation.

New instrument procedures at small aerodromes are required to be included in the national AIP if they have an international designation. In this manner, data houses would code the instrument procedures for use in the corresponding AIRAC cycle. These charts could be included in different sections of the AIP depending on the nature of the aerodrome (public use / non-public use).

AD with an intended use limited to domestic flights (GA) are out of the scope of EU NPA 2016-02 [RD-19] and ICAO Annex 15 [RD-7] (even they are under the scope of EU Basic Regulation 216/2004), so they may not be required to publish the IFP procedures within the national AIP. This scenario opens the chart publication process to other entities not considered AIS providers interested on its publication like local AD websites or pilot training organisations.

Nevertheless, according to GM ATS.OR.125 (NPA 2016-09, [RD-18]), when an UNICOM service is implemented at the AD, there is minimum information about the service that shall be promulgated to airspace users within the national AIP.

Publication on national AIP have other related implications, such as ICAO Annex 4 compliance of charting and ARINC 424 code of the procedures that may also be endangered if the publication process is out of AIP scope.

In the view of the above, arrangement to publish IFP related info within national AIS provider, even if it is not directly included in the national AIP seems to be the best available and preferred solution to guarantee that ICAO Annex 4/15 publication criteria is followed

**Implementation solution:**

The best available and preferred solution to publish IFP charts is to do it through national AIP; even if it is not a requirement if the AD is not open to international traffic.

**…still work to do:**

Consult EASA about the possibility for chart publication for GA, based on ICAO requirements, on AD website, out of national AIP.

*Proposal: European 'EAD-like' website to centralize General aviation (VFR/IFR) publication needs.*

**NOTAM**

Any aerodrome implementing an LPV approach would require a NOTAM service to notify service availability failures at that aerodrome, as described in ICAO Annex 15, Chapter 5, NOTAM [RD-7]. ICAO Annex 10 [RD-5] requires Member States to ensure that NOTAM issuance and SBAS monitoring system is available before the implementation of an SBAS-based approach.

The mechanism to provide NOTAM information for LPV for GA operations at small aerodromes when there is no ATS in place and the related agreements has to be defined. AD operator/owner, in a similar way as proposed in section 0, could centralize the formal agreements needed.

It is important to remark that ESSP, certified EU SBAS provider, provides real-time info about EGNOS service availability status on its website:

https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/airports-availability

**Implementation solution:**

NOTAM provision is needed to ensure information about navaids availability status reach airspace users. The best available and preferred solution is to follow the traditional channel through national AIS provider.

**…still work to do:**

Consult EASA about the validity NOTAM info published on Service Provider website for GA (AD non EASA, No ATS in place), i.e. EGNOS user-support website, pilot school websites

## 3.4 Flight procedure design

**Airspace structure**

AFIS/UNICOM service needs an airspace structure (class G) to define the boundaries where the service is provided, the availability of the service and the requirements for aircraft operating inside this area.

A Radio Mandatory Zone (RMZ) Class G seems to be the most suitable airspace structure.

SERA.6005 [RD-15] describes the operation within the RMZ, where an aircraft before entering a RMZ, the pilot shall make an initial call containing the designation of the station being called, call sign, type of aircraft, position, level and the intentions of the flight. This operation is quite similar as the operational concept view proposed in Section 2.

**Note: This solution has been already implemented in Germany, see Appendix A.1**

**Implementation solution:**

RMZ + Class G (5 NM, 1000 ft AGL) seems to be the most proper airspace structure to define the limits of AFIS/UNICOM services provided in small AD.

### Design criteria

Non instrument RWY definition included in ICAO Annex 14 [RD-5] defines the instrumental operation as a "***instrument approach procedure to a point beyond which the approach may continue in VMC***"

According to the existing criteria in PANS-OPS [RD-8] and the text of EASA Opinion 03-2016 [RD-16], it seems that RNP APCH based on PBN is the most suitable solution to implement instrumental approaches to non-instrument RWY. Opinion 03-2016 and ICAO SL-2012-40 [RD-10] describes the *operation 'applying general principles similar to PinS',* but currently there is not defined criteria to interpret this concept. PinS are tailored for helicopter operations, so it is expected that IFP design guidance material shall be developed to clarify the design criteria way IFP are going to be implemented at non-instrument RWYs, in order to ensure a harmonized implementation.

After a review of the applicable solutions on several EU countries, 'similar to PinS' could be understood as an IAP ending the final approach segment in VMC through the circling circuit of the AD (as a safety mitigation measure) or straight in if possible.

**Note: This solution has been already implemented in France, see Appendix A.2.**

**Implementation solution:**

IAP ending the final approach segment in VMC through the circling circuit of the AD, as a safety mitigation measure, is considered as a good practice for small AD with no ATS available (UNICOM).

### IFP design process

The regulatory frame of the IFP design process is part of EASA recent developments. It is based on ICAO Doc 9906 [RD-9], and describes the steps involved on a fight design to ensure the quality of the process.

IFP process is currently one of the processes which implicate more resources, in economic terms and qualified personnel. There are not defined direct proportionate requirements for GA to enable the implementation of IFP at small AD. In particular:

- **Procedure Validation:** To validate an IFP during the flight procedure design process, only ground validation is needed, the results of the ground validation shall determine when flight validation is required (ICAO Doc 9906). Nevertheless there is not **guidance to clarify the conditions when flight validation may not be required** and the alternative means of compliance (i.e. simulator, ground validation, local expert's assessment).
- **Safety assessment:** The introduction of new IFP at locations previously only open under VFR, is used to be considered as a 'new aviation standard', and according to ATM/ANS Common requirements a Safety study jointly with the acceptance process is required. This could impact on the requirement that the risk assessment review shall be conducted in a manner commensurate with the level of risk posed.

  In case there is not ATS defined at the AD (or it is holding a limited certificate), it is not clear who is responsible to perform the Safety Study.

  Publication of **guidance material about how to perform a proportionate safety study in small AD**, with a risk assessment methodology and/or participation of local experts, could simplify the process. UAS framework has recently published SORA methodology, a good example of proportionate requirements for risk assessments. IFP introduction at former VFR aerodromes enables the safety of the operation by itself; therefore it has no sense that safety

related issues such as safety assessment becomes a barrier to its implementation.

There are other steps of procedure design that could be subject to be reviewed to set proportionate requirements to enable instrumental operations at small AD, i.e. obstacle survey, independent IFP Designer review or the authority acceptance process.

**Implementation solution:**

ICAO IFP design process is going to be included under SES framework through EASA RMT.0445. The sponsor of the implementation process can be the ATSP, the AD, national authority or even interested users.

**…still work to do:** IFP design process is still too costly for GA. Ask EASA for proportionate IFP requirements to avoid hampering IFR introduction for General Aviation, a 'light' part-ASD.

**…still work to do:**

Implementation Guidance set:

- Adapt ICAO EUR Doc 025 contents for GA + SBAS
- EU proportional risk assessment methodology tailored for GA ('SORA-like') and development of a generic safety/risk assessment of the airspace change with templates easy to be followed and completed for small AD.
- Concept IFP design material (T or Y bar RNP APCH with LPV minima, segment lengths, glide paths and minimum heights defined based on a standard scenario) to enable the initial feasibility study.

**…still work to do:**

Ask SESARDM for innovating solutions to flight validation step, i.e. simulation studies, drone validation

## 3.5 Flight Crew Licensing

### Basic Instrument Rating

EASA NPA 2016-14 **Error! Reference source not ound.** has the objective to provide a more accessible instrument rating for pilots holding non-commercial licenses in general aviation.

Under the NPA, EASA is proposing the introduction of a Basic Instrument Rating (BIR), which is a qualification to fly in Instrument Flight Rules (IFR), but based on more proportionate requirements when compared to the traditional instrument rating and tailored to the need of GA pilots.

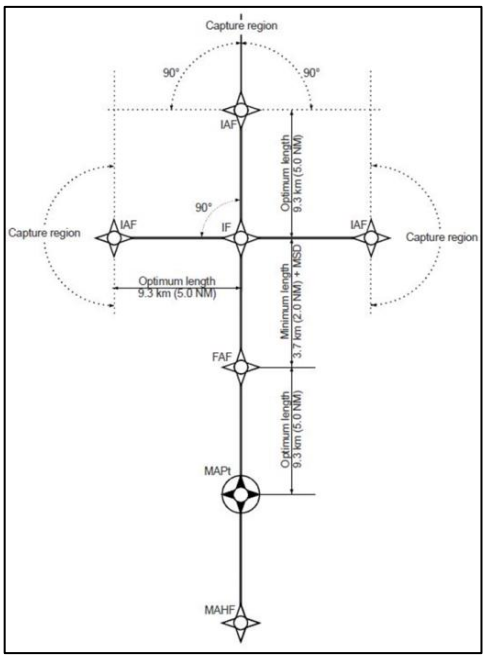
BIR holders will be restricted on an approach procedure, down to **a maximum of 500 ft** above ground level (AGL) for a 3D approach, or 600 ft AGL for a 2D approach.

**Implementation solution:**

BIR license is a proportionate solution regarding to licenses to enable the use IFR for GA pilots.

### Declared Training Organizations (DTO)

EASA (Opinion 11/2016) proposes simplified pilot training standards for leisure flying, an option to provide training for GA-related non-commercial licenses outside an Approved Training Organisation




(ATO). This new 'declared training organisation' (DTO) also benefits from simplified organisational and oversight requirements, deriving for being out of a certification process, only declaration is needed.

The text of the Opinion is not enough to clarify if DTO organization can provide BIR training

**…still work to do:**

EASA to clarify if Declared Training Organizations (DTOs) are allowed to provide BIR training. It seems that GA pilots willing to fly IFR still need to perform its training on ATOs.

## 3.6 Aeronautical Meteorological Information

Instrumental flight operations require meteorological information such as wind, temperature, etc., and for GNSS based operations the atmospheric pressure (QNH). In instrument runway operations where there is an ATSP designated to provide ATC or AFIS this meteorological information is usually given by a SES certified MET Air Navigation Service Provider.

If we take a look again to the definition of operations at non-instrument-RWY we find that it is intended for the operation of *an instrument approach procedure to a point beyond which the approach may continue in* ***visual meteorological conditions.*** If there is no requirement about the need to provide meteorological services when no ATS provider is in place, the doubt about how and who declares VMC conditions arises.

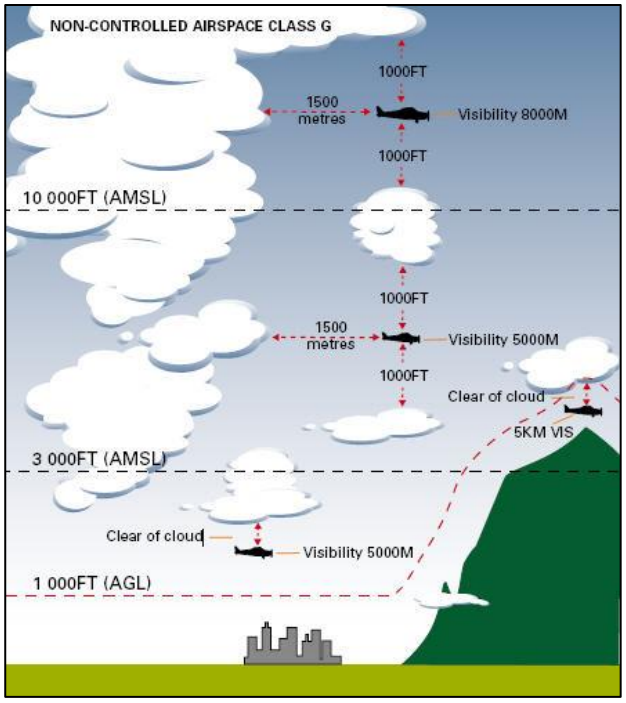



*Figure 4 – VMC conditions: source Australian CAA*

At small AD, the solutions regarding the need of meteorological information may range from the operation of a (automatic) meteorological station (AWOS/ASOS) to the intervention of a Meteorological Service Provider from a near AD/station.

In case there is no local QNH at the AD, ICAO PANS OPS [RD-8] sets that "the OCA/H shall be increased at a rate of 0.8 m for each kilometre in excess of 9 km (5 ft for each nautical mile in excess of 5 NM)"

**Automated Meteolorogical Stations**

ICAO provides guidance on how to implement and measure Automated Systems for meteolorogical stations on Manual on Automatic Meteorological Observing Systems at Aerodromes (Doc 9837). These systems are able to measure the relevant info for landing (wind, visibility, RVR, clouds, air temperature and QNH).

Météo-France and ENAC have implemented AUTO METAR. At each aerodrome equipped to issue AUTO METAR, local sensors, an automatic acquisition system and a micro-computer with a Meteo-France software called Caobs are installed. The telecommunication link between Caobs and the national centre in Toulouse is either an IP connection (Intranet) or a Public Telephone Line (for "small" airport.). This web-based service is available on about 60 aerodromes and codes METAR messages every half an hour, including visibility, cloud layers and present weather information.

This systems is coupled with PCL (pilot controlled lighting), so pilots can activate the automated message when there is no personnel on the AD.

**Implementation solution:**

To perform an instrumental approach GNSS-based, a pilot need meteorological information, in particular IMC/VMC conditions and QNH.

MET data can be provided by:

- Near MET station (solution widely adopted on EU countries)
- Automatic weather systems, transmitting met info by automatic messages (France)

**…still work to do:**

Ask EASA to clarify the frame to implement automated MET messages.

## 3.7 General Aviation SBAS equipage

For Instrument Flight Rules (IFR) operations, the type of architecture determines the functional class (beta, gamma or delta) of the SBAS receiver, as per

RTCA DO-229D, being required to be certified against the corresponding European standard (ETSO-C145c or ETSO-C146c) to use them in SBAS-based operations.

Currently, certified SBAS-enabled receivers commercialized by the main manufacturers are extensively used by the aircraft manufacturers in their brand new models. Garmin (US), Honeywell/Bendix King (US) and Avidyne (US) are the most representative ones for general aviation. The following table shows representative examples:

| Manufacturer | Product | ETSO-145c | ETSO -146c |
|---|---|---|---|
| Garmin | GIA 6XW | X | |
| | GNS400W/420W/ 420AW/430W/430AW | | X |
| | GNS 500W/530W/530AW | | X |
| | CNX80/ GNS 480 | | X |
| | GTN 625/635/650 | | X |
| | GTN 725/750 | | X |
| Honeywell/Bendix King | KFD ksn770 | | X |
| Avidyne Corp | IFD440 | | X |
| | IFD540 | | X |

Table 1– SBAS receivers for GA.

There are also numerous examples of aircraft fleet SBAS capable. Listing some of them:

- Cessna: Citation, Caravan and Single Engine
- Pilatus: PC6, PC24 and PC12/47E
- Diamond: DA20, 40XLT, 40CS, D-Jet,42 and 50
- Piper: Meridian, Seminole, Mirage, Matrix, Archer, Seneca V and Arrow
- Cirrus: SR20, SR22, SR22T and Vision SF50

So far, SBAS equipage rate in GA is high, so the need to work on new standards for light GNSS

**Implementation solution:**

ETSO-145()/ETSO-146() are currently the available standards to fly SBAS based instrumental approaches.

# 4 SUMMARY

After the review of the current status of the regulatory framework for GNSS-based operations at small AD for GA and users readiness, the main conclusion is that there is a clear implementation scenario at almost every field, but there are also barriers that could hamper the implementation process and some activities raise to enable the most proper scenario for GA community.

The proposal is to create dedicated Working Groups for each field (ADR, ATS, AIS, MET, ASD and standardization), coordinated by GA-committee and composed by experts and users in each area to review from a critical point of view the current available solutions in the EU frame. If this solution is not feasible or proportionate, some improving activities have been proposed, but GA community shall set priorities according to the utility of the action and maturity status of the field related. EASA involvement to back the operational understanding is essential to focus the resources.

The results of each WG will build a complete scenario for the service provision aspects needed to implement and provide the info needed for users to operate in IFR at small AD where currently only VFR operations are permitted. This work shall conclude on the development of a 'Practical Guide' for MS and AD operators (ideally supported by EASA) to enable the use of GNSS-based operations for GA at VFR locations, to take advantage of a high equipped fleet and enable the safety of the operation on a cost-effective way.

The aim is that GNSS based operation will no longer be considered as a 'new aviation standard' but it becomes the main navigation channel to support safer GA operations, applying EASA view for GA (more light-proportionate requirements) to the IFP implementation process.

The following table summarizes the main results of the analysis performed, separating the available implementation solutions and risky issues/barriers, followed by a proposal on activities to solve them or enhance the implementation scenario:

Table 2– Analysis of IFP implementation scenario for GA.

| Part | Sub-part | Implementation Solution | Barrier | …still work to do |
|---|---|---|---|---|
| **ADR** | RWY requirements | ☑ No upgrade on RWY infrastructure is needed to implement IFP at non-instrument RWYs | | No regulatory action is needed. |
| | Lighting | ☑ No additional requirements<br>Lighting systems affect to RVR, not to DH | | Awareness: *"no upgrade on RWY infrastructure is needed to implement IFP at any RWY type. GNSS-PBN based solutions with vertical guidance are highly recommended" (EASA Opinion 06-2011)* |
| | OLS | ☑ No additional requirements | | |
| | Certificate | ☑ GM1.ADR.AR.C.035 includes EASA form for ADR certificate. The terms of an existing certificate shall be modified to include IFR flights:<br>- Note 3, conditions to operate: IFR<br>- Note 5, type of approaches | ☒ The process of modifying an existing certificate is usually hard. | Coordinate with EASA-CAA the certification change process to clarify the documental material needed for VFR-IFR change and develop a practical guide to MS to make the certificate change process direct, including steps and schedule dates expected. |
| **ATS** | ATS level | ☑ Member states shall determine the ATS level required | ☒ The guidance to determine the ATS level is too high level.<br>The objective of EASA is to increase the safety of GA enabling IFR flights.<br>ATSP may constitute a barrier at small locations with low traffic. | |
| | ATS (AFIS) with limited certificate | ☑ AFIS with limited certificate is tailored for General Aviation AD. | | Awareness *"ATS (AFIS) with limited certificate is tailored for GA…and is not widely used"* |
| | UNICOM | ☑ UNICOM have been introduced by EASA in NPA 2016-09.<br>☑ UNICOM service is tailored for small AD with non-instrument RWYs | ☒ UNICOM service is considered out of ATSP, and out of SES framework<br>There is a lack of guidance on how to implement it. | UNICOM service provision definition |

| | | | | |
|---|---|---|---|---|
| | Formal agreements | ☑ Aerodrome Operator shall lead the required formal agreements with ANS providers (MET, CNS, AIS) | | Develop templates of formal agreements to be signed by an AD operator with other service providers<br>Could an AD operator holding an EASA certificate ask for an ATS (AFIS) limited certificate? |
| **AIS** | AIP | ☑ Publication on national AIP. | ☒ There is no obligation to publish the AD info in national AIP if the AD is not open to international traffic, so it might not be a priority for national AIS providers. | Consult EASA about new AIS channels for GA, out of national AIP. AD website?<br>*Open to discuss: European 'EAD-like' website for GA* |
| | NOTAM | ☒ IAPs are based on navaids. NOTAMs provision to inform about the status of the system are needed. National AIS provider is the channel proposed | | Consult EASA about the validity NOTAM info published on new channels, i.e. EGNOS user-support website, pilot school websites |
| **SERA/ ASD** | Airspace structure | ☑ RMZ+Class G seems to be the most appropriate figure to implement IAP at uncontrolled AD. | ☒ There is no guidance on how to limit the airspace where UNICOM services are provided. | |
| | IFP Design criteria | ☑ ICAO IFP design criteria are going to be included under SES framework through EASA RMT.0445.<br>☑ IAP ending the final approach segment in VMC through the circling circuit of the AD is considered as a good practice for small AD with UNICOM (no ATS). | ☒ There is no guidance on how to implement an approach 'to a point beyond with the flight continues in VMC' (similar to PinS<br>☒ PinS criteria are tailored to helicopters. | IFP design standard scenario (T or Y bar RNP APCH with LPV minima, segment lengths, glide paths and minimum heights defined based on a standard scenario) |
| | IFP design process | ☑ ICAO IFP design process is going to be included under SES framework through EASA RMT.0445. | ☒ There are no proportionate requirements in IFP process for GA. The main concerns are Flight validation and safety assessment | Ask EASA for proportionate IFP requirements for General Aviation, a 'light' part-ASD<br>Compile financial aids available for GA to start the implementation process |

| | | | | |
|---|---|---|---|---|
| | | ☑ The sponsor can be the ATSP, the AD, national authority or even interested users. | | Implementation Guidance:<br>- Adapt ICAO EUR Doc 025 for GA<br>- Risk assessment methodology for GA ('SORA-like')<br>- Practical safety assessment generic case/templates for GA. |
| | | | | Ask SESARDM for innovating solutions to flight validation step; i.e. simulation studies, drone validation... |
| **FCL** | BIR | ☑ Basic instrument Rating enables the IFR capacity for GA.<br>The pilot holding a BIR shall increase the DA up to 500ft | | Awareness: *"BIR license is enough for a private pilot to perform an IFR approach"* |
| | DTO | ☑ Declared Training Organizations are an enabler to more proportionate requirements to GA training associations | ☒ It is not clear that a DTO could provide training for BIR | EASA to clarify if Declared Training Organizations (DTOs) are allowed to provide BIR training |
| **MET** | MET info (QNH) | ☑ MET info can be provided by automatic systems or by near MET stations (preferred) | ☒ It is not clear the minimum info needed for IFP operations. | Ask EASA to clarify the frame to implement automated MET messages. |
| **GNSS receivers** | SBAS equipage | ETSO-145() and ETSO 146() are available certified receivers for SBAS based procedures | | |

# APPENDIX A IFP FOR GA IN EU COUNTRIES

There are some countries where IFP are already been implemented at AD where there in not an ATS in place or the operating time schedule it is limited. . Each country has adopted a different approach to ensure the safety of the operation; this section compiles the most representative ones, namely Germany, France, Switzerland and UK.

## Appendix A.1 Germany

Germany has accomplished changes on its airspace structures with the premise that an aircraft shall be within controlled airspace the most part of the time flight. The change consists of rounding uncontrolled AD, formerly VFR, with IFR operations with RMZ categorized as airspace Class G. Additionally the adjacent airspace (Class E) lower limit has been reduced to 1000 ft AGL.

The decision to lower the surrounding controlled airspace class E allows starting the approach procedure under ATC clearance, ending the approach with only flight information (if requested). In this way DFS assumes the responsibility on the procedure, and the implications associated.

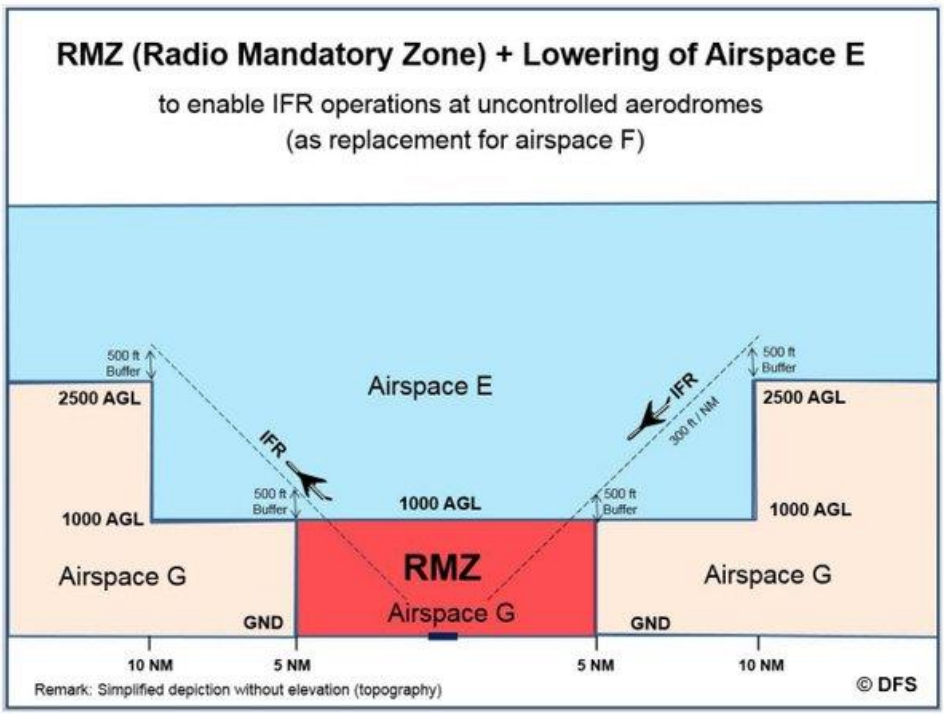



*Figure 4 RMZ. Germany Airspace*

The RMZ replaces the ATZ commonly used for ATC AD, having the advantage that ATZ's do not have an obligation of the radio connection. Before entering on the RMZ it is obligatory to report the call sign, aircraft type and pilot's intention, even if they are blind messages. It is mandatory to report leaving the RMZ as well.

This operations are intended for small aircraft in non-commercial operations at small AD, since in Germany ATC is mandatory for aircraft with MTOW>14000kg in commercial air transport.

**Case of Study: Eggenfelden (AIP Germany)**

- RWY dimensions:

| Designations RWY NR | TRUE BRG | Dimensions of RWY (m) | Strength (PCN) and surface of RWY and SWY | THR coordinates RWY end coordinates THR geoid undulation | THR elevation and highest elevation of TDZ of precision APP RWY |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| 08 | 87.20° | 1160 x 23 | 46 ASPH | N 48 23 44.720 E 012 42 51.513 | THR 1342 ft |
| 26 | 267.20° | 1160 x 23 | 46 ASPH | N 48 23 46.397 E 012 43 42.981 | THR 1333 ft |

- ATS service: ATIS+AFIS, APP München:

| Service designation | Call sign | Channel/ Frequency (MHZ) | Hours of operation | Remarks |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| ATIS | EGGENFELDEN ATIS | 125.075 | WIN: 0800 – SS SUM: 0700 – SS MAX 1700 Other times: PPR | Designated operational coverage 25 NM, FL 100 |
| APP | MUENCHEN RADAR | 129.550 | H24 | |
| AFIS | EGGENFELDEN INFO | 120.300 | WIN: 0800 – SS SUM: 0700 – SS MAX 1700 Other times: PPR | Designated operational coverage 25 NM, 4000 ft AGL |

- Airspace: RMZ Class G

| | | |
|---|---|---|
| 1 | Designation and lateral limits | RMZ |
| 2 | Vertical limits | 1000 ft AGL |
| 3 | Airspace classification | G |

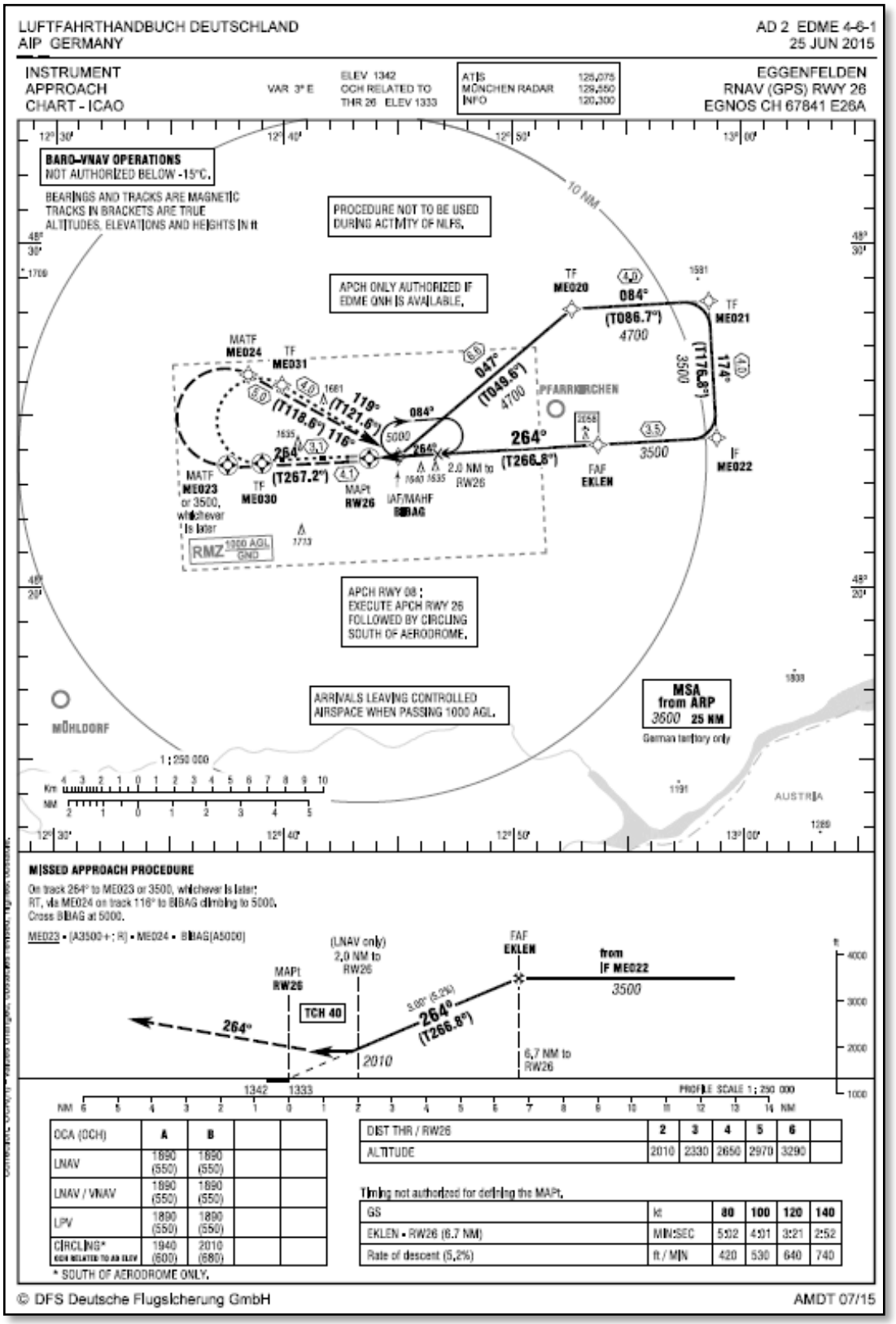
- MET: MET info in provided by external MET office:

| | | |
|---|---|---|
| 1 | Associated MET Office | Meteorological advisory center for aviation (MAC) South |
| 2 | Hours of service MET Office outside hours | H24 |

- OCA Minima published:

| OCA (OCH) | A | B | | |
|---|---|---|---|---|
| LNAV | 1890 (550) | 1890 (550) | | |
| LNAV / VNAV | 1890 (550) | 1890 (550) | | |
| LPV | 1890 (550) | 1890 (550) | | |
| CIRCLING* OCH RELATED TO AD ELEV | 1940 (600) | 2010 (680) | | |

* SOUTH OF AERODROME ONLY.


LUFTFAHRTHANDBUCH DEUTSCHLAND
AIP GERMANY
AD 2 EDME 4-6-1
25 JUN 2015
INSTRUMENT APPROACH CHART - ICAO
VAR 3° E
ELEV 1342
OCH RELATED TO THR 26 ELEV 1333
ATIS 125,075
MÜNCHEN RADAR 129,550
INFO 120,300
EGGENFELDEN
RNAV (GPS) RWY 26
EGNOS CH 67841 E26A
BARO-VNAV OPERATIONS
NOT AUTHORIZED BELOW -15°C.
BEARINGS AND TRACKS ARE MAGNETIC
TRACKS IN BRACKETS ARE TRUE
ALTITUDES, ELEVATIONS AND HEIGHTS IN ft
PROCEDURE NOT TO BE USED DURING ACTIVITY OF NLFS.
APCH ONLY AUTHORIZED IF EDME QNH IS AVAILABLE.
APCH RWY 08 :
EXECUTE APCH RWY 26
FOLLOWED BY CIRCLING
SOUTH OF AERODROME.
ARRIVALS LEAVING CONTROLLED AIRSPACE WHEN PASSING 1000 AGL.
MSA from ARP
3600 25 NM
German territory only
10 NM
MATF ME024
TF ME031
TF ME020
TF ME021
TF ME022
MATF ME023
or 3500, whichever is later
TF ME030
MAPt RW26
IAF/MAHF BIBAG
FAF EKLEN
PFARRKIRCHEN
MÜHLDORF
AUSTRIA
RMZ 1000 AGL / GND
2.0 NM to RW26
MISSED APPROACH PROCEDURE
On track 264° to ME023 or 3500, whichever is later;
RT, via ME024 on track 116° to BIBAG climbing to 5000.
Cross BIBAG at 5000.
ME023 • (A3500+; R) • ME024 • BIBAG(A5000)
(LNAV only)
2,0 NM to RW26
MAPt RW26
FAF EKLEN
from IF ME022
3500
TCH 40
264°
(T266.8°)
3.00° (5.2%)
2010
6,7 NM to RW26
1342
1333
PROFILE SCALE 1 : 250 000
OCA (OCH) A B
LNAV 1890 (550) 1890 (550)
LNAV / VNAV 1890 (550) 1890 (550)
LPV 1890 (550) 1890 (550)
CIRCLING* OCH RELATED TO AD ELEV 1940 (600) 2010 (680)
* SOUTH OF AERODROME ONLY.
DIST THR / RW26 2 3 4 5 6
ALTITUDE 2010 2330 2650 2970 3290
Timing not authorized for defining the MAPt.
GS kt 80 100 120 140
EKLEN - RW26 (6.7 NM) MIN:SEC 5:02 4:01 3:21 2:52
Rate of descent (5,2%) ft / MIN 420 530 640 740
© DFS Deutsche Flugsicherung GmbH
AMDT 07/15

## Appendix A.2 France:

French AIP states how to perform instrumental operations when there is no ATS in place:

*ENR 1.5.2.10 Utilization of instrument procedures without air traffic service at the aerodrome Instruments approach procedures are only permitted in following conditions:*

- *the parameter "altimeter setting QNH" is transmitted by a STAP (Automatic transmission system of parameters) ;*
- *QNH is transmitted by a designated station referred on the IAC.*
- *alternate airfield, selected by operator or aircrew is provided with an ATC unit during planned operating hours.*

*The approaches procedures are compulsorily followed with a circling for which minima are possibly increased and published. By night, an operator agent should have to be at the aerodrome to carry out scheduled air public transport operations and should to get approval instructions from the suitable air traffic service enabling him to trig the safety plan of aerodrome and emergency phases if necessary.*
*The instruments approach procedures are not allowed when:*

- *the following sentence is published: "prohibited procedure out of ATS HOR" (on account of necessary coordination, dangerous surroundings which prohibit definitely such manoeuvers):*
- *no approved station is published, and no STAP (Automatic transmission system of parameters) on the aerodrome.*

As a case study, **Ouessant AD (AIP France)** has LPV approaches implemented:

- RWY dimensions:

**AD 2 LFEC.12** **Caractéristiques physiques des pistes *Runway physical characteristics***

| RWY ID | Orientation Geo (MAG) | Dimensions *RWY* | PCN | Surface | Position GEO THR (DTHR) | ALT | SWY CWY | Bande *Strip* | |
|---|---|---|---|---|---|---|---|---|---|
| 05 | 051 (054) | 833 x 24 | 5.7 t | revêtue / paved | 48°27'38.05"N 005°04'06.71"W ( 48°27'39.77"N 005°04'03.50"W ) | THR: 119 ft DTHR : 120 ft | SWY 50 m CWY 30 m | | |
| 23 | 231 (234) | 833 x 24 | 5.7 t | revêtue / paved | 48°27'54.94"N 005°03'35.11"W ( 48°27'52.87"N 005°03'38.99"W ) | THR: 142 ft DTHR : 139 ft | CWY 30 m | | |

- ATS service: AFIS with limited operational schedule:

| | | | |
|---|---|---|---|
| 7 | ATS | AFIS du 01/10 au 31/05 :<br>LUN - VEN : 0700-0930, 1330-1630.<br>SAM : 0700-0930, 1430-1630.<br>DIM - JF : 1430-1630.<br>du 01/06 au 30/09 :<br>LUN-SAM : 0700-1030, 1330-1630.<br>DIM et JF : 1430-1630.<br>En dehors de ces HOR : - O/R PN 1 HR pour évacuations sanitaires.<br>- PPR la veille, exclusivement pour vols commerciaux non programmés.<br>Aérodrome d'OUESSANT - TEL : 02 98 48 82 09 - FAX : 02 98 48 88 29.<br>E-mail : aerodrome.ouessant@free.fr | AFIS from 01/10 to 31/05 :<br>MON - FRI: 0700-0930, 1330-1630.<br>SAT : 0700-0930, 1430-1630.<br>SUN - HOL : 1430-1630.<br>from 01/06 to 30/09 :<br>MON-SAT : 0700-1030, 1330-1630.<br>SUN and HOL : 1430-1630.<br>Outside these SKED:<br>- O/R PN 1 HR for EVASAN.<br>PPR the day before, only for non scheduled commercial flights.<br>Aérodrome d'OUESSANT - TEL : 02 98 48 82 09 - FAX : 02 98 48 88 29.<br>E-mail : aerodrome.ouessant@free.fr |

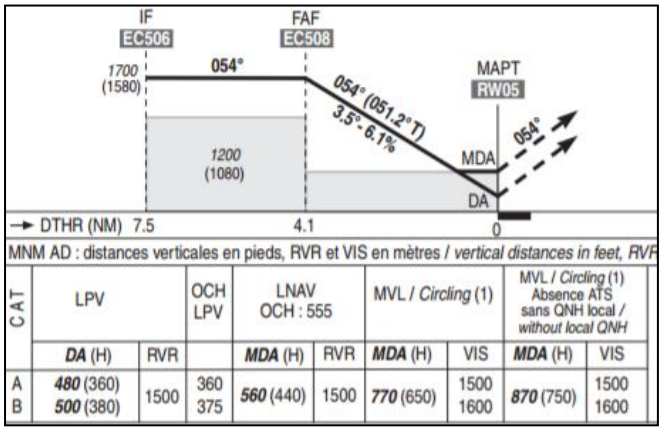
- MET: MET info in provided by BREST MET office (QNH)

| | | |
|---|---|---|
| 1 | Centre MET associé / *Associated MET Office* | BREST |

- Frequencies available:

**APP** : NIL
**TWR** : NIL
**AFIS** : OUESSANT Information 118.1 (FR seulement / *FR only*)
Absence ATS : **A/A** FR seulement. Obtenir le QNH de Brest auprès de IROISE Approche 135.825.
***A/A*** *FR only. Obtain Brest QNH from IROISE Approach 135.825.*

- OCA Minima published:

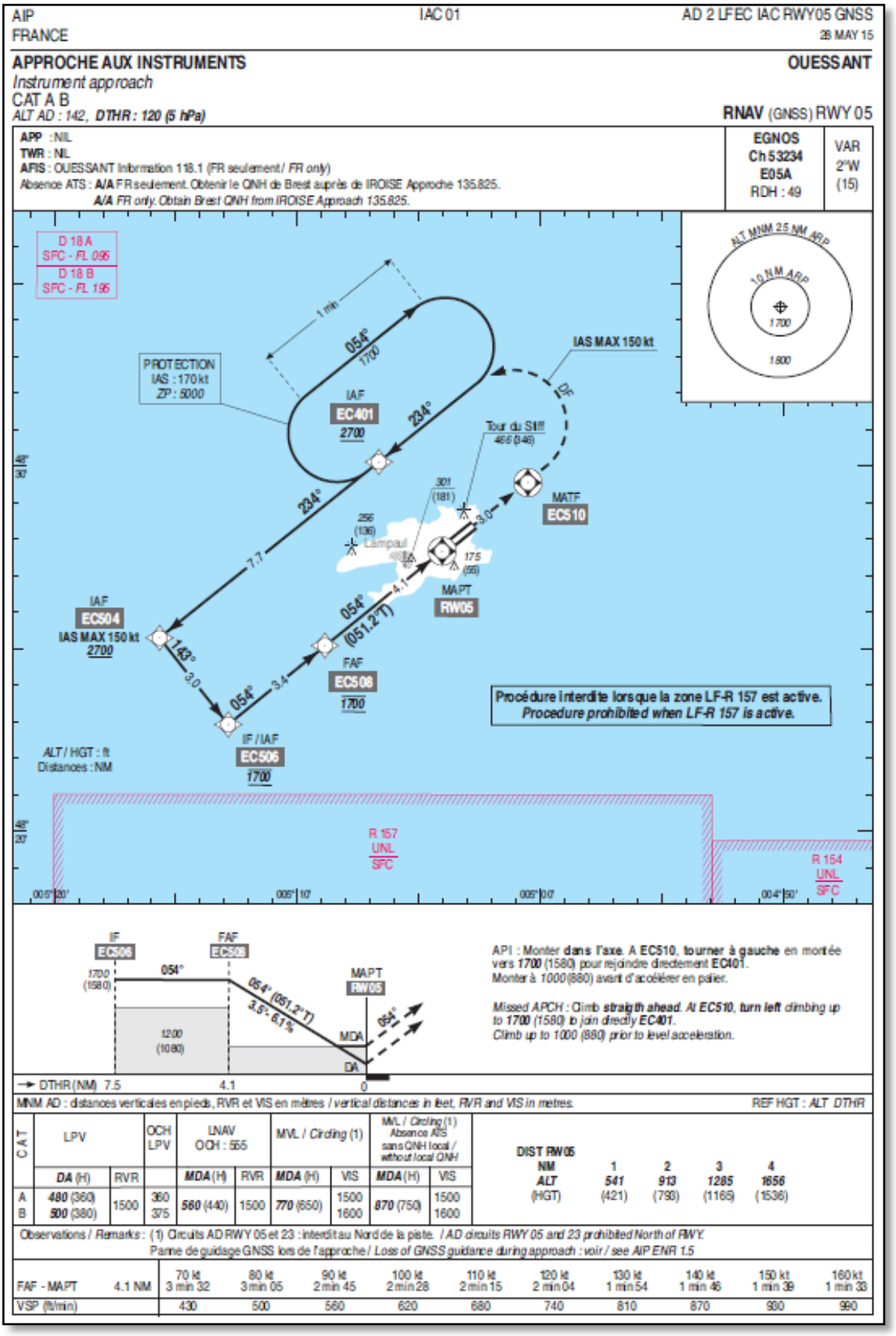



MNM AD : distances verticales en pieds, RVR et VIS en mètres / *vertical distances in feet, RVR*

| CAT | LPV | | OCH LPV | LNAV OCH : 555 | | MVL / *Circling* (1) | | MVL / *Circling* (1) Absence ATS sans QNH local / *without local QNH* | |
|---|---|---|---|---|---|---|---|---|---|
| | ***DA*** (H) | RVR | | ***MDA*** (H) | RVR | ***MDA*** (H) | VIS | ***MDA*** (H) | VIS |
| A | ***480*** (360) | 1500 | 360 | ***560*** (440) | 1500 | ***770*** (650) | 1500 | ***870*** (750) | 1500 |
| B | ***500*** (380) | | 375 | | | | 1600 | | 1600 |

IAP are allowed when there is no ATS, but with the restriction of ending the approach with the circling approach. This understanding is aligned with ICAO new definition, depicting approach operations to non-instrument RWY as 'similar to PinS'.

MET info is provided either by an automated MET service or by the nearest AD, and in such a way it is published on its AIP. When there is not a Local QNH, the corresponding limitation to MDA is also published. The usual Unicom frequency for small non-towered fields is 123.50Mhz


AIP
FRANCE
IAC 01
AD 2 LFEC IAC RWY05 GNSS
28 MAY 15
APPROCHE AUX INSTRUMENTS
Instrument approach
CAT A B
ALT AD : 142, DTHR : 120 (5 hPa)
OUESSANT
RNAV (GNSS) RWY 05
APP : NIL
TWR : NIL
AFIS : OUESSANT Information 118.1 (FR seulement / FR only)
Absence ATS : A/A FR seulement. Obtenir le QNH de Brest auprès de IROISE Approche 135.825.
A/A FR only. Obtain Brest QNH from IROISE Approach 135.825.
EGNOS
Ch 53234
E05A
RDH : 49
VAR
2°W
(15)
D 18 A
SFC - FL 095
D 18 B
SFC - FL 195
ALT MNM 2.5 NM ARP
1.9 NM ARP
1700
1800
PROTECTION
IAS : 170 kt
ZP : 5000
1 min
054°
1700
IAF
EC401
2700
234°
IAS MAX 150 kt
DF
Tour du Stiff
466 (346)
301
(181)
MATF
EC510
3.0
256
(136)
Lampaul
175
(55)
MAPT
RW05
234°
7.7
4.1
054°
(051.2°T)
IAF
EC504
IAS MAX 150 kt
2700
143°
3.0
054°
3.4
FAF
EC508
1700
IF / IAF
EC506
1700
Procédure interdite lorsque la zone LF-R 157 est active.
Procedure prohibited when LF-R 157 is active.
ALT / HGT : ft
Distances : NM
R 157
UNL
SFC
R 154
UNL
SFC
005°20'
005°10'
005°00'
004°50'
IF
EC506
FAF
EC508
MAPT
RW05
1700
(1580)
054°
054° (051.2°T)
3.5° 6.1%
MDA
DA
1200
(1080)
054°
API : Monter dans l'axe. A EC510, tourner à gauche en montée vers 1700 (1580) pour rejoindre directement EC401.
Monter à 1000 (880) avant d'accélérer en palier.
Missed APCH : Climb straigth ahead. At EC510, turn left climbing up to 1700 (1580) to join directly EC401.
Climb up to 1000 (880) prior to level acceleration.
DTHR (NM) 7.5
4.1
0
MNM AD : distances verticales en pieds, RVR et VIS en mètres / vertical distances in feet, RVR and VIS in metres.
REF HGT : ALT DTHR
CAT
LPV
OCH LPV
LNAV OCH : 555
MVL / Circling (1)
MVL / Circling (1) Absence ATS sans QNH local / without local QNH
DA (H)
RVR
MDA (H)
VIS
A
B
480 (360)
500 (380)
1500
360
375
560 (440)
770 (650)
1500
1600
870 (750)
1500
1600
DIST RW05
NM
ALT
(HGT)
1
541
(421)
2
913
(793)
3
1285
(1165)
4
1656
(1536)
Observations / Remarks : (1) Circuits AD RWY 05 et 23 : interdit au Nord de la piste. / AD circuits RWY 05 and 23 prohibited North of RWY.
Panne de guidage GNSS lors de l'approche / Loss of GNSS guidance during approach : voir / see AIP ENR 1.5
FAF - MAPT
4.1 NM
70 kt
3 min 32
80 kt
3 min 05
90 kt
2 min 45
100 kt
2 min 28
110 kt
2 min 15
120 kt
2 min 04
130 kt
1 min 54
140 kt
1 min 46
150 kt
1 min 39
160 kt
1 min 33
VSP (ft/min)
430
500
560
620
680
740
810
870
930
990

## Appendix A.3 Switzerland

CAA has published Directive SI/SB-001 ”IFR Approach Minimum on Non-Instrument Runways” applicable to IFR procedures for non-instrument RWYs by Jan 2010.

The main restriction is the limitation of the minimum published OCH down to 500 ft AGL:

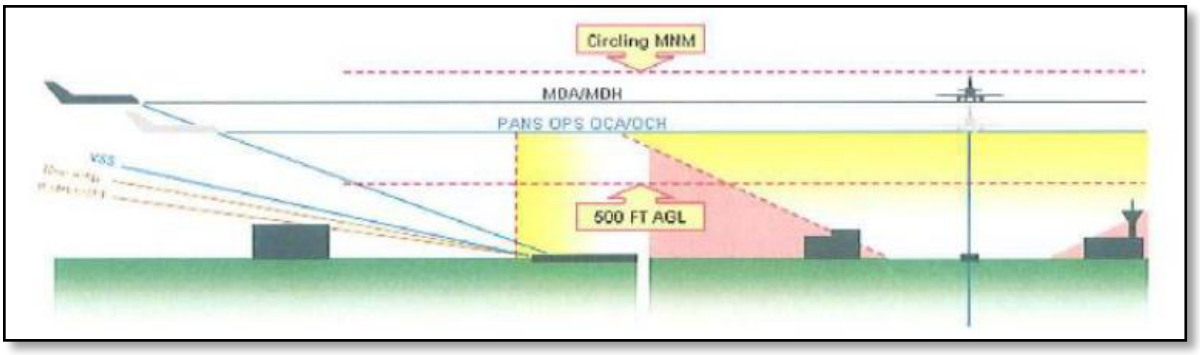



*Figure 1*

*Switerland. OCA/H 500ft limitation*

All AD in Switzerland are under controlled airspace, through its special orography, the limitations are related to the RWY dimensions. GNSS based procedures, due to the flexibility in airspace design; provide high advantages in comparison with conventional ones and are widely implemented.

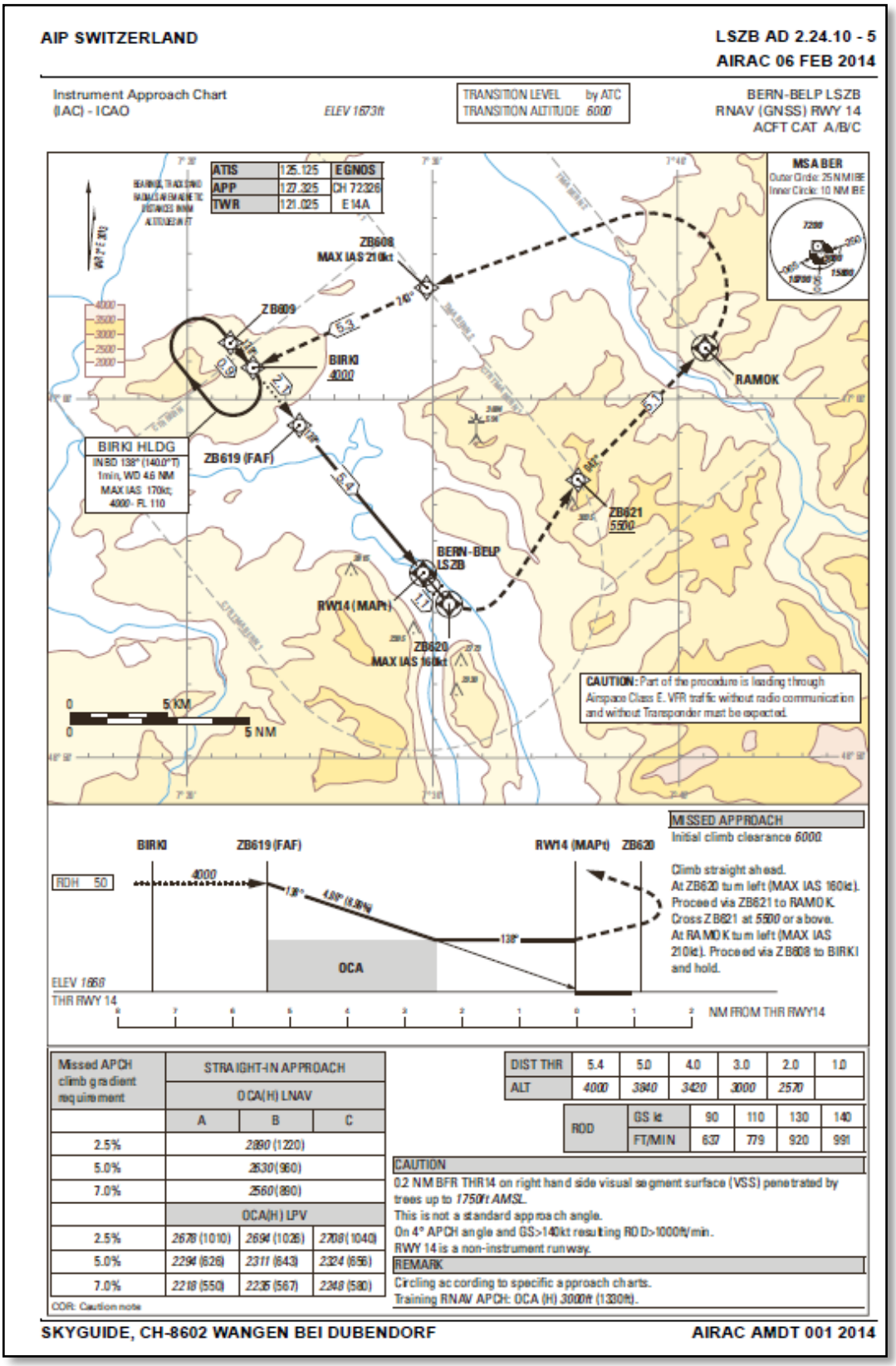
**Case of study, Bern AD (AIP Switerland):**

- RWY: Non instrument. 1730x30m

| Designations RWY NR | SWY dimensions (m) | CWY dimensions (m) | Strip dimensions (m) | OFZ | Remarks REF: AD 1.1.6.2.4 |
|---|---|---|---|---|---|
| 1 | 8 | 9 | 10 | 11 | 12 |
| 14 | NIL | 60 x 150 | 1850 x 150 | NIL | Non instrument RWY. RESA: 90 m (both sides) FCT: 0.78/*0.66* grooved 1730 m (full RWY length) |
| 32 | | NIL | | | Non instrument RWY. RESA: 90 m (both sides) FCT: 0.78/*0.70* grooved 1730 m (full RWY length) |

- ATS: TWR+APP
- MET: Own Office
- OCA Minima published: Over 500ft OCH

| Missed APCH climb gradient requirement | STRAIGHT-IN APPROACH | | |
|---|---|---|---|
| | OCA(H) LNAV | | |
| | A | B | C |
| 2.5% | *2890* (1220) | | |
| 5.0% | *2630* (960) | | |
| 7.0% | *2560* (890) | | |
| | OCA(H) LPV | | |
| 2.5% | *2678* (1010) | *2694* (1026) | *2708* (1040) |
| 5.0% | *2294* (626) | *2311* (643) | *2324* (656) |
| 7.0% | *2218* (550) | *2235* (567) | *2248* (580) |



AIP SWITZERLAND

LSZB AD 2.24.10 - 5
AIRAC 06 FEB 2014

Instrument Approach Chart
(IAC) - ICAO

ELEV 1673ft

TRANSITION LEVEL by ATC
TRANSITION ALTITUDE 6000

BERN-BELP LSZB
RNAV (GNSS) RWY 14
ACFT CAT A/B/C

| | | |
|---|---|---|
| ATIS | 125.125 | EGNOS |
| APP | 127.325 | CH 72326 |
| TWR | 121.025 | E14A |

MSA BER
Outer Circle: 25 NM IBE
Inner Circle: 10 NM IBE

ZB608
MAX IAS 210kt

ZB609

BIRKI
4000

RAMOK

BIRKI HLDG
INBD 138° (140.0°T)
1min, WD 4.6 NM
MAX IAS 170kt;
4000 - FL 110

ZB619 (FAF)

ZB621
5500

BERN-BELP
LSZB

RW14 (MAPt)

ZB620
MAX IAS 160kt

CAUTION: Part of the procedure is leading through Airspace Class E. VFR traffic without radio communication and without Transponder must be expected.

0 5 KM
0 5 NM

BIRKI ZB619 (FAF) RW14 (MAPt) ZB620

RDH 50

4000

138°

4.08° (6.98%)

OCA

ELEV 1668

THR RWY 14

NM FROM THR RWY14

MISSED APPROACH
Initial climb clearance 6000
Climb straight ahead.
At ZB620 turn left (MAX IAS 160kt).
Proceed via ZB621 to RAMOK.
Cross ZB621 at 5500 or above.
At RAMOK turn left (MAX IAS 210kt). Proceed via ZB608 to BIRKI and hold.

| Missed APCH climb gradient requirement | STRAIGHT-IN APPROACH | | |
|---|---|---|---|
| | OCA(H) LNAV | | |
| | A | B | C |
| 2.5% | 2890 (1220) | | |
| 5.0% | 2630 (960) | | |
| 7.0% | 2560 (890) | | |
| | OCA(H) LPV | | |
| 2.5% | 2678 (1010) | 2694 (1026) | 2708 (1040) |
| 5.0% | 2296 (626) | 2311 (643) | 2324 (656) |
| 7.0% | 2218 (550) | 2235 (567) | 2248 (580) |

COR: Caution note

| DIST THR | 5.4 | 5.0 | 4.0 | 3.0 | 2.0 | 1.0 |
|---|---|---|---|---|---|---|
| ALT | 4000 | 3840 | 3420 | 3000 | 2570 | |

| ROD | GS kt | 90 | 110 | 130 | 140 |
|---|---|---|---|---|---|
| | FT/MIN | 637 | 779 | 920 | 991 |

CAUTION
0.2 NM BFR THR14 on right hand side visual segment surface (VSS) penetrated by trees up to 1750ft AMSL.
This is not a standard approach angle.
On 4° APCH angle and GS>140kt resulting ROD>1000ft/min.
RWY 14 is a non-instrument runway.

REMARK
Circling according to specific approach charts.
Training RNAV APCH: OCA (H) 3000ft (1330ft).

SKYGUIDE, CH-8602 WANGEN BEI DUBENDORF

AIRAC AMDT 001 2014

## Appendix A.4 United Kingdom

In the UK, the Civil Aviation Authority (CAA), has published in May 2014 a document titled 'Application for Instrument Approach Procedures to Aerodromes without an Instrument Runway and/or Approach Control' (CAP-1122, **Error! Reference source not found.**), guidance for the implementation process of IAPs (mainly based n GNSS) to runways not classified as instrument runways and/or without an ATC service. It is important to remark that new EASA requirements could supersede UK CAA CAP 1122 **Error! Reference source not found.**, as it permits the implementation of instrumental procedures at non-instrument RWY. The document is available at:

http://www.caa.co.uk/application.aspx?catid=33&pagetype=65&appid=11&mode=detail&id=6252

CAP 1122 **Error! Reference source not found.** is a risk-based methodology rather than a standard-based aimed o ensure operational safety. The operator/owner of an aerodrome with a non-instrument runway and/or no Approach Control service interested in deploying an IAP operation will therefore have to produce a sound Safety Case containing enough safety assurance arguments (specific for the aerodrome and airspace environment) to clearly demonstrate how the associated risks can be mitigated locally by alternative means.

The risk assessment is focused on aspects such as Controlled Flight-Into-Terrain (CFIT), mid-air collision, runway collision, runway excursion, loss of control, or impact assessment of the introduction of a new IAP on local procedures.

In the recent years UK CAP 1122 **Error! Reference source not found.** process has been started by several AD, ike Sherburn-in-Elmet or Stapleford AD, but no approval has still granted by UK CAA, though expectations are to have first implementations by 2018.

EASA AMC and GM were amended by **Error! Reference source not found.** in response to the changes ntroduced to Air Ops regulations **Error! Reference source not found.** so as to establish the standard operating procedures for the new PBN specifications, including RNP APCH to LPV minima.

Generally speaking, most of these SOPs were already contained in former AMC20-XX and have now been introduced in the corresponding Parts ORO, CAT, NCC, NCO, SPO and SPA from Air Ops and even in Part-FCL from Air Crew. **Error! Reference source not found.** below provides details on the exact items or equirements which have been introduced or modified in the above mentioned Parts but, for the sake of clarity and easier reading, these are presented now aggregated per topic or time of applicability during the flight.

# APPENDIX B REFERENCE DOCUMENTS AND ACRONYMS

## Appendix B.1 Reference documentation


[RD-1] EGNOS Safety of Life Service Definition Document

[RD-2] Regulation (EC) No 216/2008 of 20/02/2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency

[RD-3] Commission Regulation (EU) No 139/2014 laying down requirements and administrative procedures related to aerodromes

[RD-4] ICAO Annex 14 Aerodromes

[RD-5] ICAO Annex 10 Vol I Aeronautical Telecommunications

[RD-6] ICAO Annex 11 Air Traffic Services

[RD-7] ICAO Annex 15 Aeronautical Information Service

[RD-8] ICAO Doc 8168 PANS-OPS

[RD-9] ICAO Doc 9906 Quality Assurance Manual for Flight Procedure Design

[RD-10] ICAO State Letter SL-2012-40

[RD-11] EASA Easy Access Rules AIR OPS (Regulation (EU) No 965/212 + AMC/GM)

[RD-12] Easy Access Rules for Aerodromes (Regulation (EU) No 139/2014 + AMC/GM)

[RD-13] Commission implementing regulation (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight

[RD-14] Commission Implementing Regulation (EU) No 1035/2011 of 17 October 2011 laying down common requirements for the provision of air navigation services

[RD-15] Commission Implementing Regulation(EU) No 923/2012 of 26/09/2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation (SERA)

[RD-16] EASA Opinion 03-2016 Maintaining the aerodromes rules - ICAO new approach classification

[RD-17] EASA NPA 2016-14 Easier access for general aviation pilots to instrument flight rules flying

[RD-18] EASA NPA 2016-09(A) Requirements for Air Traffic Services

[RD-19] EASA NPA 2016-02 Requirements for Aeronautical Information Management (AIS-AIM)

[RD-20] EASA NPA 2016-14 Easier Access for General Aviation

[RD-21] EASA Opinion 11-2016 Training outside approved training organisations

[RD-22] CAP 1122 Application for Instrument Approach Procedures to Aerodromes without an Instrument Runway and/or Approach Control

## Appendix B.2 Acronyms

| Acronym | Description |
|---|---|
| AD | Aerodrome |
| ADR | Aerodrome |
| AFIS | Aerodrome Flight Information Service |
| AGL | Above Ground Level |
| AIM | Aeronautical Information Management |
| AIP | Aeronautical Information Publication |
| AIRAC | Aeronautical Information Regulation and Control |
| AIS | Aeronautical Information Service |
| AMC | Acceptable Means of Compliance |
| ANSP | Air Navigation Service Provider |
| APCH | Approach |
| ASD | AirSpace Design |
| ASOS | Automated Surface Observing System |
| ATC | Air Traffic Control |
| ATIS | Air Traffic Information Service |
| ATM | Air Traffic Management |
| ATS | Air Traffic Service |
| AWOS | Automated Weather Observing System |
| BIR | Basic Instrument Rating |
| CAA | Civil Aviation Authority |
| CAT | Commercial Air Traffic |
| CFIT | Controlled Flight into Terrain |
| CNS | Communication, Navigation and Surveillance |
| DA/H | Decision Altitude/Height |
| ETSO | European Technical Standard Order |
| EWA | EGNOS Working Agreement |
| FCL | Flight Crew Licensing |
| FIS | Flight Information Service |
| FPD | Flight Procedure Design |
| GA | General Aviation |
| GM | Guidance Material |
| GNSS | Global Navigation Satellite System |
| GSA | European GNSS Agency, |
| IAC | Instrument Approach Chart |
| IAP | Instrument Approach Procedure |
| IFP | Instrumental Flight Procedure |
| IFR | Instrumental Flight Rules |
| IMC | Instrumental Meteorological Conditions |
| IR | Implementing Rule |
| LPV | Localizer Performance with Vertical guidance |
| MS | Member State |
| MTOW | Maximum Take-Off Weight |
| NM | Nautical Mile |
| NOTAM | Notice to Airmen |
| NPA | Notice of Proposed Amendment |
| NSA | National Supervisory Authority |
| OCA/H | Obstacle Clearance Altitude/Height |
| OLS | Obstacle Limiting Surface |
| PBN | Performance Based Navigation |
| QNH | Atmospheric Pressure |
| RMT | RuleMaking Task |
| RNP APCH | Required Navigation Performance Approach (NAV Spec) |
| RVR | Runway Visual Range |
| RWY | Runway |
| SDD | Service Definition Document |
| SES | Single European Sky |

| Acronym | Description |
|---|---|
| SORA | Specific Operations Risk Assessment |
| UAS | Unmanned Aircraft System |
| UNICOM | Universal Communications |
| VFR | Visual Flight Rules |
| VMC | Visual Meteorological Conditions |
| WG | Working Group |