EASA
European Union Aviation Safety Agency

All weather operations

07.09.2022

BREAK back at 15:10

easa.europa.eu/connect

Your safety is our mission.

An Agency of the European Union

Agenda for today (1)

- 1. **EASA SESSION ON AWO IMPLEMENTATION (50 minutes) 13:00-13:50**
  - *a. Welcome from Safety Promotion (John Franklin - EASA) and Section Manager Air Operations (Micaela Verissimo - EASA)*
  - *b. EASA presentation on AWO implementation manual (Francisco Arenas Senior Expert Air Operations and Project manager RMT.0379 AWO).*
  - *c. Approval of ongoing operations (Bo Eckerbert – Swedish Transport Agency).*
  - *d. Questions and Answer to the Authorities (LBA, AESA, EASA, etc).*

  - *Break 13:50 to 14:00*

Agenda for today (2)

- 2. **STAKEHOLDER SESSION (1h) 14:00-15:00**
  - *a. Explanation about the use of previous operational data (Stefano Prola - IATA)*
  - *b.* Operator's view on the implementation of AWO *(Valentin Minning - DHL)*
  - *c. Implementation of EFVS in SBAS operations (David Mcpherson – European Union Agency for the Space Programme).*
  - *d. Service provider's view on the implementation of AWO (Jeppesen, Navblue and LIDO)*

- Break 15:00 to 15:10.

- **PANEL DISCUSSION AND QUESTIONS (50 minutes – 1h).**
  - *Participants: Carsten Mildt – LBA Germany, Silvia Troncoso – AESA Spain, Fernando Bernal – AESA Spain, Rafael Cardoso – AESA Spain, Mario Hempel Ettelt – Jeppesen, Dario Pierandrei – LIDO, Michael Straw – LIDO, Elliot Cox – NAV BLUE, Ian Morris – NAV BLUE, Feidhlim Brogan – NAV BLUE.*

EASA
European Union Aviation Safety Agency

All-weather operations (AWO)

AWO implementation manual

September 2022
Francisco ARENAS ALVARINO
Senior Expert Air Operations & Air Crew Expert.

Your safety is our mission.

An Agency of the European Union

OPS community

- → Welcome (europa.eu)
- → Draft All Weather Ops Manual | EASA Community (europa.eu)
- → AWO manual
- → AWO implementation manual V0.10 date 06.09.2022 Version CLEAN.pdf (europa.eu)
- → We want your comments.

Questions

- Concerning Lido charts, will you change the definition of point 3 in eRM general part 1.8.3.4.6.1.3 since the term CMV is not used anymore in the table 9 RVR versus DH/MDH in AMC5 CAT.OP.MPA.110?
- What minimum RVR does apply to EFVS-L?
- As EASA AIR OPS operators fly worldwide, how does Jeppesen support such operators with EASA AIR OPS compliant aerodrome operating minima in countries where aerodrome operating minima are determined in different ways or according to other regulations?

Questions 2

- → do you plan to offer to the customer the capability to request for a customization of the minimum RVR in order to cover their EFVS operations?
- → Is it possible for an operator to continue performing actual aerodrome operational assessment forgetting about desktop assessment? (Operator may not have sufficient staff or time to work on those paper

Questions 3

- If there is no LVO procedures info provided in AIP AD 2.22 for an aerodrome, is an aircraft operator obliged to check whether Low Visibility Procedures are approved at that aerodrome? Do they inform the aerodrome operator they intend to employ an approach such as SA CAT I in advance? In any MS?
- The new AMC1 SPA.LVO.105(g) requires the operator, in the item (d)(2), to establish indicators that should include "measures of performance of the airborne equipment for low-visibility approaches". Could you please help us by giving some examples of indicators to comply with this?

Question 4

- As per Gulfstream AFM 02-09-10/EASA AFM 01-34-70: EFVS operations may be conducted till 100 feet above the touchdown zone elevation. To descend below 100 feet HAT, visual cues must be seen without the aid of EVS. Question may it be considered an EFVS 200 operation?
- To be able to apply AMC9 CAT.OP.MPA182, is flight monitoring mandatory? It says that the operator should as a minimum have it but not that the operator shall have it.

EASA
European Union Aviation Safety Agency

Thank you for your attention!

easa.europa.eu/connect

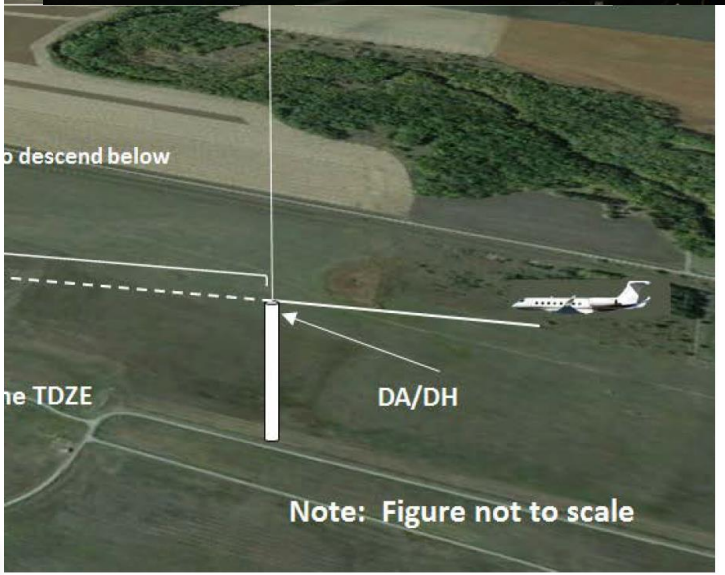
Your safety is our mission.

An Agency of the European Union

Performance based aerodrome operating minima


Arriving at waypoint
211°
18L
INSET
SENSOR
PFD
CDI
XPDR
IDENT
TMR/REF
NRST
ALERTS


to Touchdown

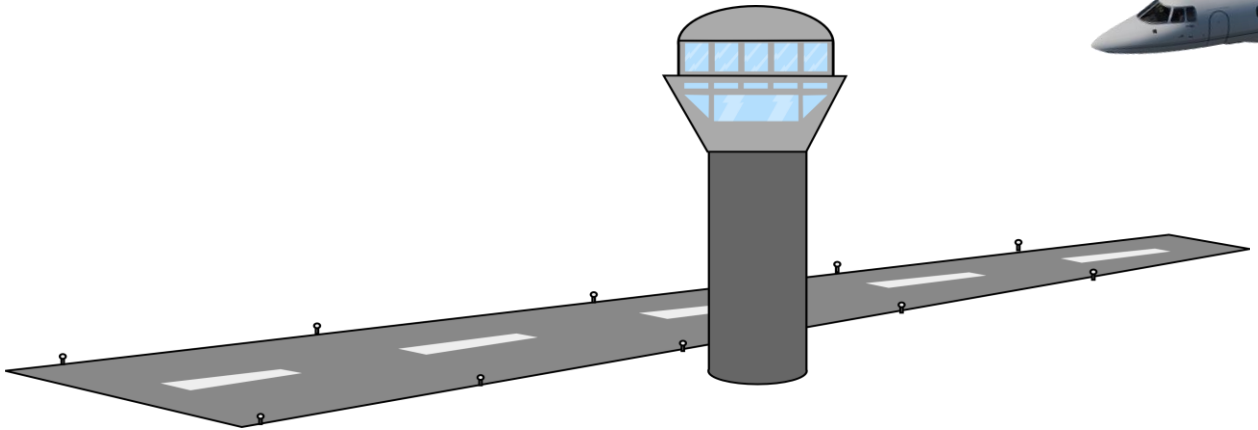

descend below
TDZE
DA/DH
Note: Figure not to scale

OVERVIEW OVER THE AWO PROJECT:

Total system approach:

Affected stakeholders and regulations:

1) Aircraft Operators - Reg. 965/2012 on Air Operations
2) Pilots - Reg.(EU) 1178/2011 on Flight Crew Licensing:
3) ADR operations and infrastructure - Reg.(EU) 139/2014 on Aerodrome safety
4) Aircraft manufacturers - CS–AWO (ED Decision 2022/007/R) Airworthiness



RMT.0379 – AWO

Performance based Regulation

- Safety objective in IR
  - **'technology neutral'**.
- Technical requirements in soft-law
  - CS, AMC and GM detailed the required technology.

Regulations affected:

- Air Operations: Reg. 965/2012
- Flight Crew Licensing: Reg.(EU) 1178/2011
- Aerodromes: Reg.(EU) 139/2014
- Airworthiness: CS–AWO

Total system approach

- Assess the combination of:
  - **Aircraft +**
  - **ground infrastructure +**
  - **approach minima.**
- Requires a cross-domain approach
  - Certification + OPS + FCL + Aerodromes

Stakeholders affected:

- Aeroplanes + helicopters: CAT, NCC, NCO & SPA
- ATO
- Aerodromes
- Aircraft manufacturers

Entry into force

→ Original Equipment Manufacturers (TC/STC)

30 March 2022 – easyaccess rules updated in May 2022.

→ Aerodrome regulations + AMC/GM

01 August 2022 – easyaccess rules will be updated soon.

→ Air OPS regulation + FCL (removal section 6 Appendix 9)

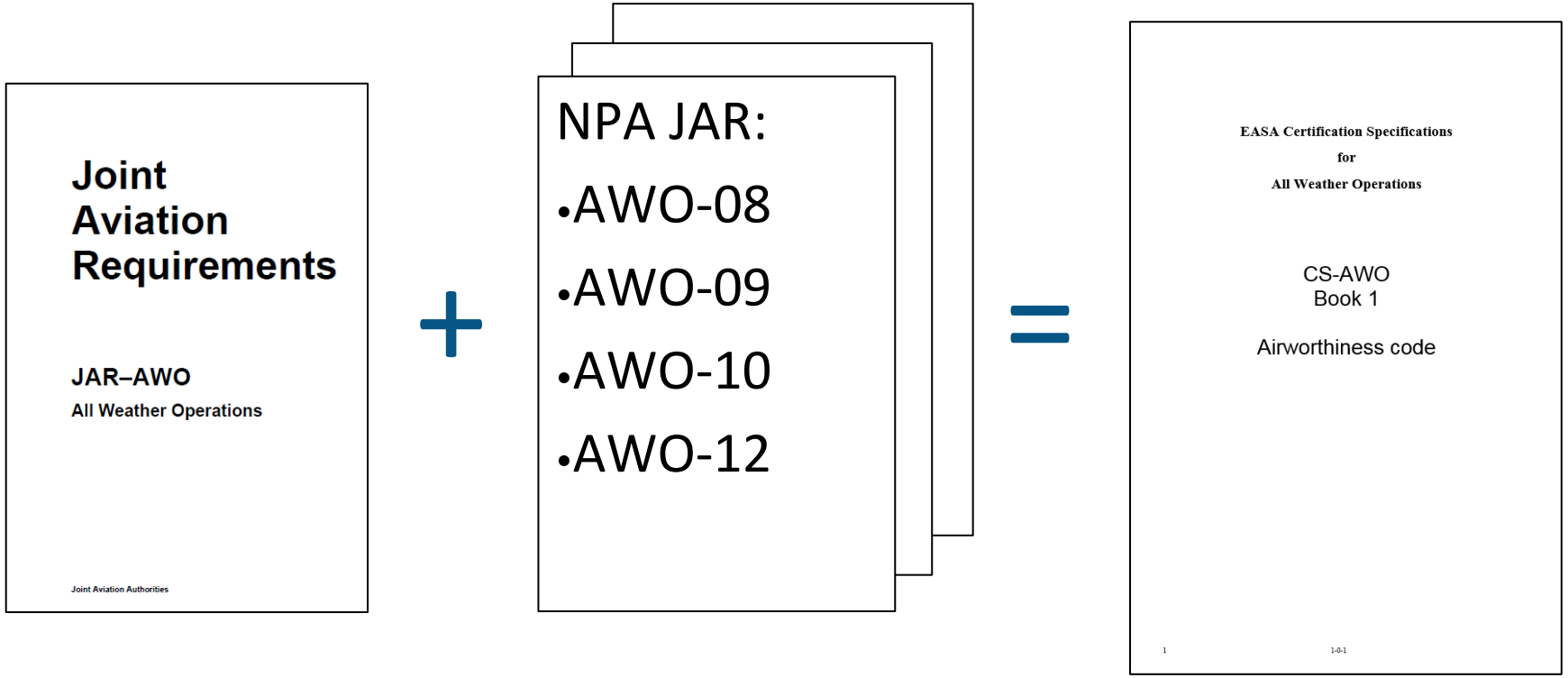
30 October 2022 – easyaccess rules Feb 2022 only IR.

EASA
European Union Aviation Safety Agency

CS-AWO Issue 2

Carl GARVIE
EASA Regulations Officer
Initial Airworthiness Standards and Specifications

Evolution of CS-AWO Initial Issue



Building blocks for CS-AWO Issue 2

NPA No.	Description
JAR AWO-11	High Altitude Landing System Performance
JAR AWO-13	Introduction of Head-Up Guidance Landing System Requirements
JAR AWO-14	Structural Limit Loads and Lateral Touchdown Performance
JAR AWO-15	Autobrake for Category 3B and Anti-Skid Issues
JAR AWO-16	JAR/FAR 25.1329 harmonization plus other points
JAR AWO-17	Super Fail-Passive Cat 3 Operations and additional Guidance Material

Building blocks for CS-AWO Issue 2

The following EASA Certification Review Items were incorporated in the interim document:

CRI	Description
CRI K-02	Automatic Landing Distance
CRI K-07	GBAS Landing System for Cat 1 Operations
CRI K-09	Extrapolation of Wind Limits for Autoland Demonstration
CRI K-XX	Landing Distances using Head-Up Display

Original CS-AWO Issue 1 structure

Subpart 1	Automatic Landing Systems
Subpart 2	Airworthiness certification of aeroplanes for operations with decision heights below 60 m (200 ft) down to 30 m (100 ft) – Category 2 operations
Subpart 3	Airworthiness certification of aeroplanes for operations with decision heights below 30 m (100 ft) or no decision height – Category 3 operations
Subpart 4	Directional guidance for take-off in low visibility

New CS-AWO Issue 2 structure

Subpart A - ENABLING EQUIPMENT	
Section 1	Automatic Landing Systems
Section 2	Head Up Displays (HUD)
Section 3	Enhanced Flight Vision Systems (EFVS)
Section 4	Synthetic Vision Guidance Systems (SVGS)
Section 5	Combined Vision Systems (CVS)

New CS-AWO Issue 2 structure

SUBPART B - APPROACH AND LANDING	
Section 1	Airworthiness certification of aeroplanes for Type B operations with decision heights/altitude below 250 ft down to 200 ft – Category 1 operations (CAT I)
Section 2	Airworthiness certification of aeroplanes for operations with decision heights below 60 m (200 ft) and down to 45 m (150 ft) – Special Authorisation Category 1 operations (SA CAT I)
Section 3	Airworthiness certification of aeroplanes for operations with decision heights below 60 m (200 ft) and down to 30 m (100 ft) – Category 2 operations (CAT II)
Section 4	Airworthiness certification of aeroplanes for operations with decision heights below 30 m (100 ft) or no decision height – Category 3 operations (CAT III)
Section 5	Airworthiness certification of aeroplanes for operational credits for visual segment in reduced Runway Visual Range (RRVR)

New CS-AWO Issue 2 structure

Subpart C - Take Off	
Section 1	Airworthiness certification of aeroplanes for take-off operations in low visibility (TOO)

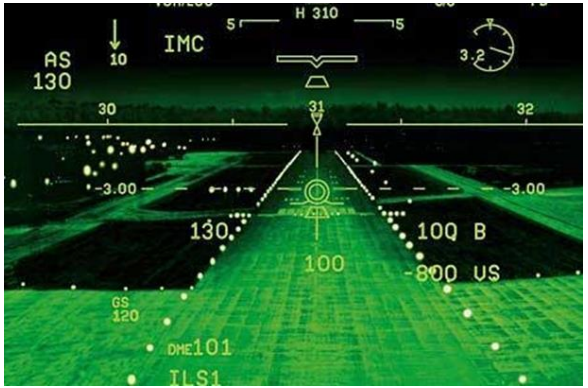
New elements of CS-AWO Issue 2

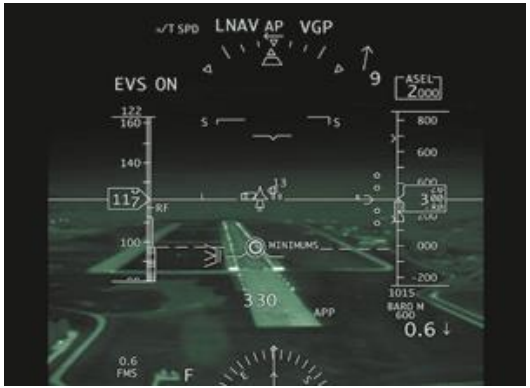
→ Head-Up Displays (HUD landing systems):

→ Requirements based on JAA NPAs and JAA HUD papers and EASA CRIs

New elements of CS-AWO Issue 2

- → Enhanced Flight Vision Systems (EFVS)
  - → Requirements based on FAA AC 20-167B and DO-315B
- → Both EFVS Approach (100ft) and EFVS Landing System (Touchdown)
- → Visual advantage performance provided in the AFM.





New elements of CS-AWO Issue 2

- → Synthetic Vision Guidance System (SVGS)
  - → Requirements based on DO-359
- → Combined Vision Systems also included.

New elements of CS-AWO Issue 2

- → Special Authorisation CAT I (SA CAT I)
  - → Requirements based on amended CAT II requirements
- → Any specific limitations are provided in the AFM;
- → Example eligible technologies listed in CS-AWO AMC:
  - → HUDs (or equivalent displays) with flight guidance that comply with performance requirements;
  - → SVGSs that comply with performance requirements;
  - → Automatic approach systems combined with a HUD (or equivalent display) to help with the flight path monitoring and control after the DH;

New elements of CS-AWO Issue 2

- → Special Authorisation CAT I (SA CAT I)
  - → Requirements based on amended CAT II requirements
- → Example eligible technologies listed in CS-AWO AMC:
  - → Automatic landing systems that comply with performance requirements using a CAT I ILS beam model;
  - → Automatic landing systems (as above) with a HUD (or equivalent display) to help with the flight path monitoring before and after the DH;
  - → Any other flight guidance system that can demonstrate the required performance.

EASA
European Union Aviation Safety Agency

Regulation (EU) 2022/208
All-weather operations (AWO)

Vasileios STEFANIOROS
EASA – Senior Expert, Aerodromes
AWO Webinar – 19 May 2022

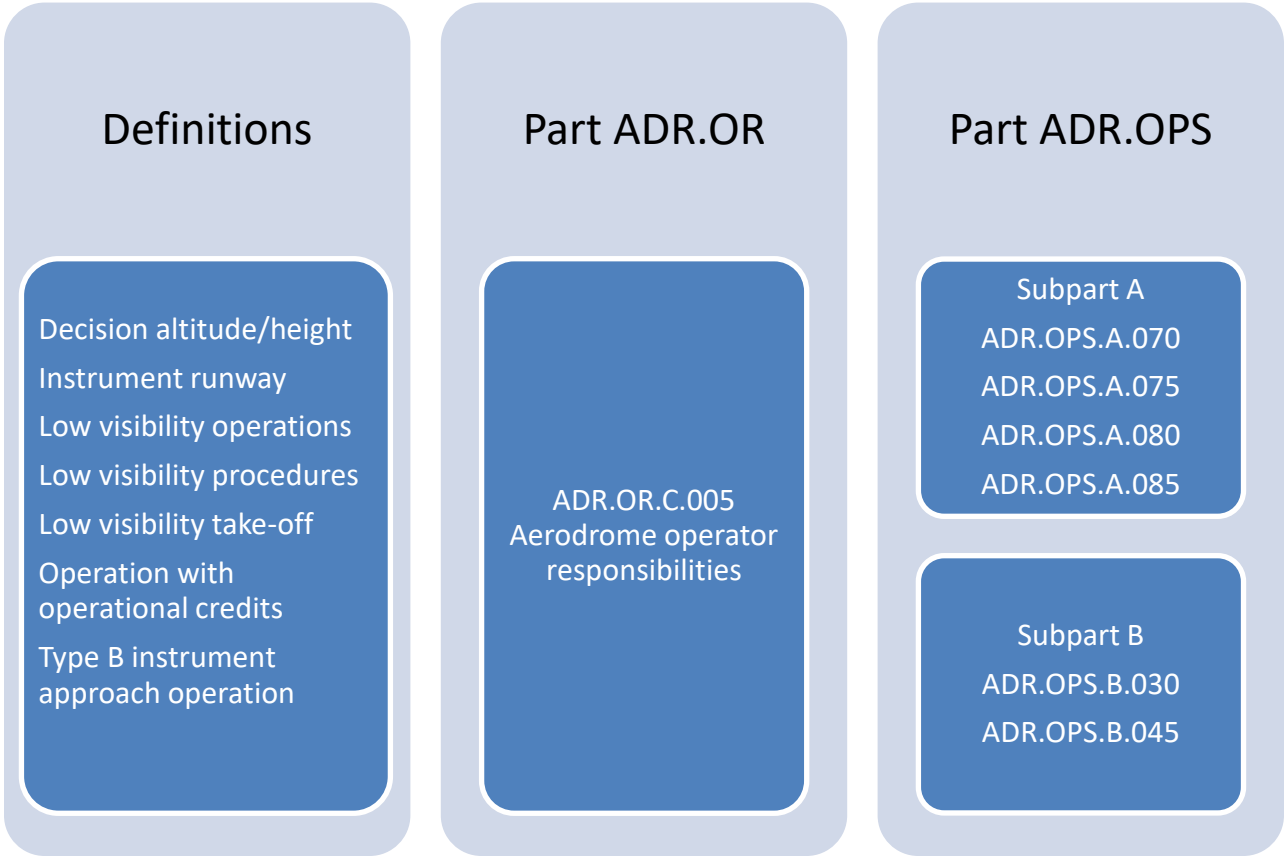
Your safety is our mission.

An Agency of the European Union

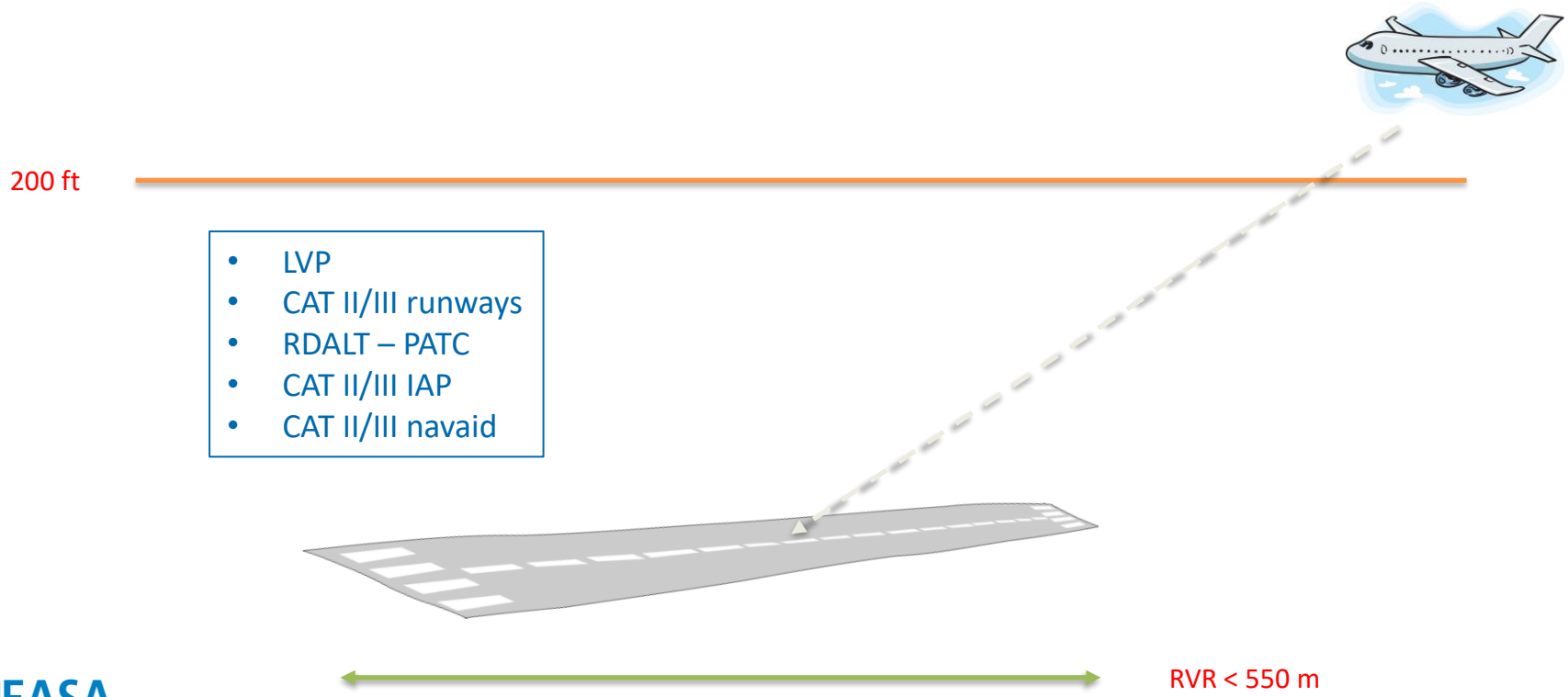
Background information

- Reasons for change
  - Alignment with ICAO Annex 6 and 14 and ICAO Doc 9365 ‘AWO Manual’
  - Support the implementation of AWO by ensuring:
    - availability of appropriate visual and non-visual aids
    - availability of required information
    - implementation of appropriate procedures

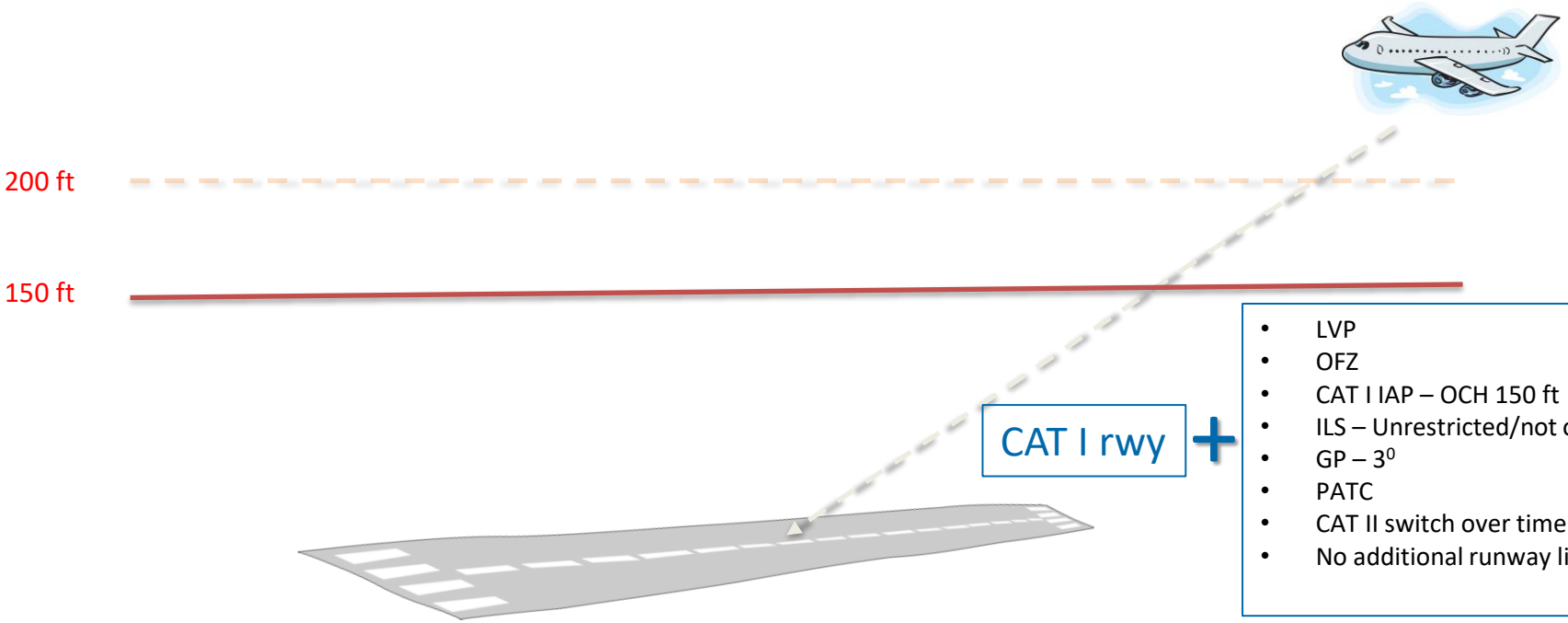
Affected rules



The Basic Principle

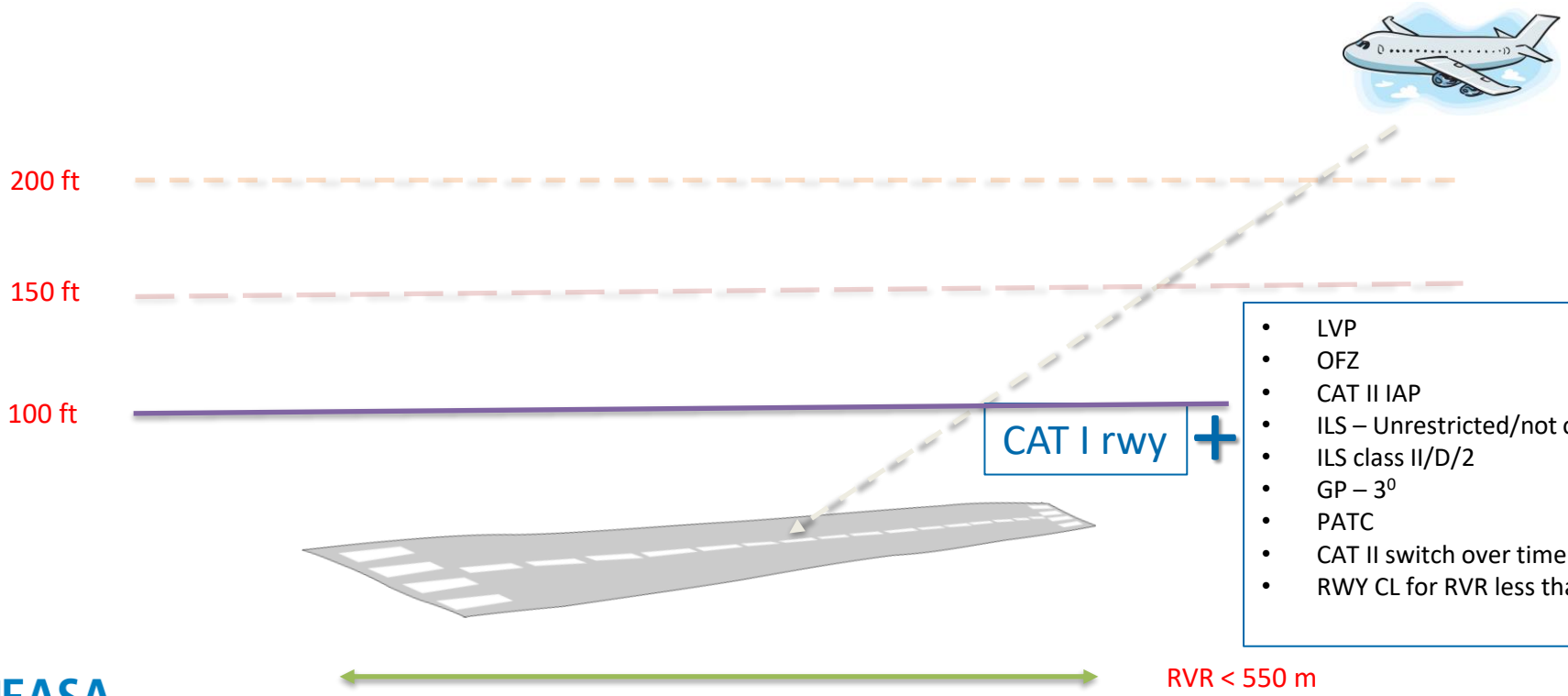


Special Authorization (SA) CAT I



- LVP
- OFZ
- CAT I IAP – OCH 150 ft
- ILS – Unrestricted/not off-set
- GP – 3^0
- PATC
- CAT II switch over time
- No additional runway lights

Special Authorization (SA) CAT II



- LVP
- OFZ
- CAT II IAP
- ILS – Unrestricted/not off-set
- ILS class II/D/2
- GP – 3^0
- PATC
- CAT II switch over time
- RWY CL for RVR less than 400m

EFVS operations

- EFVS 200
  - operation in which the approach continues without reliance on the pilot's natural vision to a height not lower than 200 ft above threshold elevation of not lower than 200 ft above threshold elevation and in visibility conditions equivalent to RVR not lower than 550 m
- EFVS Approach (EFVS-A)
  - operation in which the approach continues without reliance on the pilot's natural vision to a height above the threshold elevation of lower than 200 ft but not lower than 100 ft above threshold elevation and in visibility conditions equivalent to RVR less than 550 m
- EFVD Landing (EFVS-L)
  - operation in which the approach continues without reliance on the pilot's natural vision and any restriction to a height above the threshold elevation and in visibility conditions equivalent to RVR less than 550 m

EFVS Operations

EFVS 200

- IAP providing at least lateral guidance in which the final approach track is offset by a maximum of 3° from the extended CL of the runway
- Either an OFZ is established or the VSS is not penetrated by obstacles and an instrument departure procedure is established

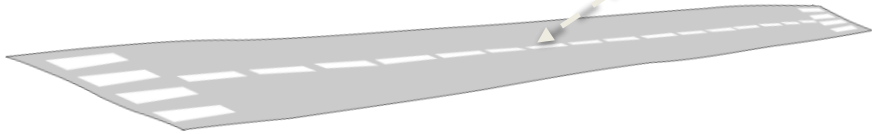
200 ft

EFVS-A

- Straight-in IAP
- Either an OFZ is established or the VSS is not penetrated by obstacles and an instrument departure procedure is established
- TDZ RVR is available
- LVP
- CAT II/III switch-over times

100 ft

EFVS-L



EFVS – A
+
- ICAO Type A chart
- ICAO PATC

LVP - SMGCS

→ No significant changes

→ Re-arrangement of existing text between IR/AMC/GM

→ No operational changes

EASA
European Union Aviation Safety Agency

Thank you for your attention!

easa.europa.eu/connect

Your safety is our mission.

An Agency of the European Union

EASA
European Union Aviation Safety Agency

OPS overview

easa.europa.eu/connect

Your safety is our mission.

An Agency of the European Union

AWO - OPS main features

- → Introduction of the ICAO concept of “operational credits”
- → Reduction of the operational demonstration for CATII and CATIII
- → Re-draft of the regulation to improve clarity (e.g. CDFA, app ban…).
- → LVO’s Licence Proficiency Checks requirements are move to OPS

AWO – Helicopters main features

- → Enable helicopter IFR point in space (PinS) approaches and departures to destination with little aerodrome infrastructure.
- → Operational credit for helicopter IFR operating under a approval

AWO - Suitability of runways

What is the issue?

→ Removal of the operational demonstration

- → Today each aircraft type and runway-end requires an operational demonstration
- → There are different standards for Certification and for Aerodromes.

Why did we need to change?

→ To improve aerodrome availability

- → Better use of the infrastructure
- → Reduction of the environmental impact – increase the availability of alternate aerodromes.
- → Economic advantage
  - → Charter flights and new routes - more flexibility of the airline network
  - → Fuel savings related to alternate aerodromes.

→ To prepare the future of new Autoland technologies.

Suitability of runways – Concept:

- 90% of runways are within the certification assumptions (both for CS-AWO issue 1 and issue 2)
  - New CS-AWO issue 2 will require more transparency
  - New ADR rules will required more transparency
  - Operator's assessment of aerodrome subject to authority approval
- What do we do with the other 10%?
  - Use of previous operational data. If not possible:
    - Use other operator's operational data
    - Use of other aircraft models operational data, subject to manufacturer's statement
    - Use manufacturer's computer simulations or Full flight simulator
  - Operational demonstration.

Regulatory Concept Runway suitability.

→ The operator can choose 3 options (or a combination of them) to demonstrate safe operations into an LVO runway:

1. Grandfathering: previous ACFT Operational data and runway combination.
   - →Operator's self operational data or
   - →Another operator data with the same ACFT. – IATA can play a role here.

NEW →Other ACFT models operational data, subject to manufacturer's statement

2. Desktop Assessment: Assessment of airport data against AFM data. NEW
   - →Includes CS-AWO Issue 2 and CS-AWO Issue 1 (the majority of aircrafts).
   - →Allow other OEM data when AFM is not clear or is missing information.
   - →Allow alternative procedure when airport data is not available in the AIP.
3. Operational assessment: traditional operational demonstration.

Suitability of runways – Summary:

- Assessment of the runways:
  - Desktop analysis (New)
    - compare AFM data with ADR data
  - Previous operational data
  - Operational demonstration

Suitability of runways – Task Force

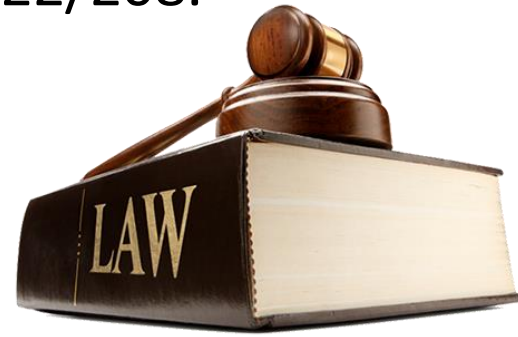
- Authorities: Germany + Sweden + France.
- Manufacturers: Airbus + Boeing.
- Industry: IATA (IATA personnel + Iberia + Lufthansa group)

Entry into force:

Note: publication of CS-AWO issue 2 was in 1Q/2022

→ Publication **Implementing rules**:

- → Air OPS and Air Crew → Published Q4/2021 →
- → Reg. (EU) 2021/2237 and Reg. (EU) 2021/2227
- → Aerodromes → published Q1/2022 → Reg. 2022/208.
- → Applicability
  - → Air OPS and Air Crew → 30.10.2022
  - → Aerodromes → 01.08.2022



→ Publication **AMC&GM** → Q2/2022.

Implementation support

- Webinar 19.05.2022 (13:00 – 16:30) on All weather operations
  - It will include an OPS, ADR and CT overview.
  - Explanation of the process of suitability of runways.
  - https://www.easa.europa.eu/newsroom-and-events/events/webinar-all-weather-operations.

- 2nd Webinar 07.09.2022 (13:00 – 16:30) on AWO - Tentative
  - Administrative actions

EASA
European Union Aviation Safety Agency

Back-up slides

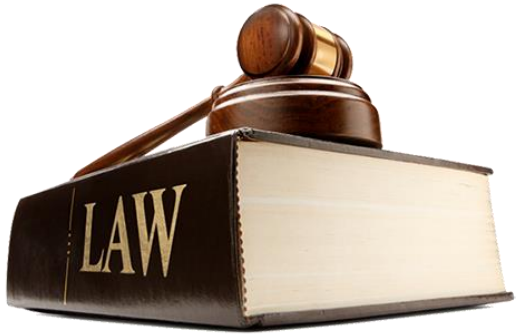
EASA
European Union Aviation Safety Agency

NEXT presentation OPS

aerodromes@easa.europa.eu

Entry into force:

- → Publication:
  - → Air OPS and Air Crew → Published in 2021 → Reg. 2021/223
  - → Aerodromes → published Q1/2022 → Reg. 2022/208
- → Applicability
  - → Air OPS and Air Crew → 30.10.2022
  - → Aerodromes → 01.08.2022



Draft ED Decision – AMC & GM:

- → Publication → Q2/2022.
- → Combined Decisions
  - → Air OPS + Air Crew + Aerodromes

- → Changes since Opinion 02/2021:
  - → Small changes as a consequence of the EASA committee's comments.
  - → One AMC related to Line checkers.
  - → Comprehensive change in AMCs SPA.LVO.110 as a consequence of work to address the topic of suitability of runways.

Note: publication of CS-AWO issue 2 was 1Q/2022

CS-AWO Issue 2- CS AWO.A.ALS.107

CS AWO.A.ALS.107 Aerodrome conditions

ED Decision 2022/007/R

Expected aerodrome conditions (e.g. elevation, ambient temperature, touchdown zone slope and ground profile under the approach path) shall be considered and appropriate limitations entered in the AFM. (See AMC AWO.A.ALS.106, paragraph 5)

CS-AWO Issue 2 - CS AWO.A.ALS.113 General

CS AWO.A.ALS.113 General

ED Decision 2022/007/R

The aeroplane flight manual (AFM) shall contain the limitations, procedures and other information pertinent to the operation of the automatic landing system and shall include the following appropriate to the use for which the particular system has been certified:

(a) the approved limits established as a result of consideration of the factors listed in CS AWO.A.ALS.106(a) and CS AWO.A.ALS.106(a);

(b) the approved limits established as a result of consideration of any other factor that the certification has shown to be appropriate;

(c) the normal and abnormal procedures, including airspeeds;

(d) the minimum required equipment;

(e) any additional aeroplane performance limitations (see CS AWO.A.ALS.109);

(f) the type of xLS navigation means (facilities external to the aircraft) and associated limitations (if any) which have been used as the basis for certification (see AMC AWO.A.ALS.113(f)); and

(g) runway or airport conditions, including:

  (1) runway elevation;

  (2) approach path slope;

  (3) touchdown zone slope;

  (4) ground profile under the approach path.

CS-AWO Issue 2 -AMC AWO.A.ALS.106 Performance demonstration

1.3 In accordance with CS AWO.A.ALS.107, the effects of aerodrome conditions (e.g. elevation, ambient temperature, touchdown zone slope and ground profile under the approach path) are to be investigated and, if necessary, appropriate limitations derived for inclusion in the AFM. For the purposes of this assessment, the touchdown zone slope is considered to be the slope of the runway between threshold up to 900 m from the runway threshold. Guidance is given in paragraph 5.

CS-AWO Issue 2 -AMC AWO.A.ALS.106 Performance demonstration

5.2 Ground profile

5.2.1 Where use is made of height above ground indicators that depends on the ground profile (such as radio-altimeter signals)in the automatic landing system, any effects of the ground profile before the runway or along the runway on the performance of the system should be examined.

5.2.2 The family of profiles to be investigated should take due account of the way in which the system uses the height above ground indicator (such as radio-altimeter signals) at different heights on the approach. Terrain and runway up slopes, down slopes and other terrain irregularities should be investigated.

Note: Information on the characteristics of aerodromes is contained in ICAO Annex 14. The examination of a number of aerodromes used for automatic landing has shown that the following features may be encountered:

a. sloping runway – slopes of 0.8 %;

b. hilltop runway – 12·5 % slope up to a point 60 m prior to the threshold; or

c. sea-wall – 6 m (20 ft) step up to threshold elevation at a point 60 m prior to the threshold.

CS-AWO Issue 2 -AMC AWO.A.ALS.106 Performance demonstration

5.2.3 Performance demonstration on a particular runway

The acceptable average values for probabilities of exceedance limits of CS AWO.ALS.106 provided in paragraph 1.4 consider all possible runways where the aircraft can be operated. When considering a particular aerodrome some factors identified in paragraphs 1.2 and 1.4 are known (e.g. altitude, runway length, specific ILS characteristics, touchdown zone and pre-runway threshold longitudinal profile, etc.). In order to assess adequate performance on a particular runway, limit risks can be used as success criteria, having all other parameters varying within their approved limits unless specific restrictions apply to this runway.

CS-AWO Issue 2 - AMC AWO.A.ALS.113(f)

AMC AWO.A.ALS.113(f) Aeroplane flight manual

ED Decision 2022/007/R

The aeroplane flight manual (AFM) should define the categories of xLS ground facilities, or space facilities (if applicable), which have been used as the basis for certification. The AFM may also contain a statement on the possible usage of automatic landing on lower categories of xLS ground facilities, or space facilities (if applicable).