# Regional Seminar on MMEL/MEL and Special Operations

[ Airbus Amber ]

## Organized by ICAO Regional Office for Western and Central Africa (WACAF)

## Dakar - Senegal - from 30 June to 5 July 2025


# LVO (Low Visibility Operations)

Julien BERNAGE, AIRBUS Approach and Navigation Flight Ops specialist

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# Manage Take-Off & Approach In degraded conditions



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#1 Concept

#2 Regulations

#3 Airport Facilities

#4 Aircraft Capability

#5 Flight Crew Qualification

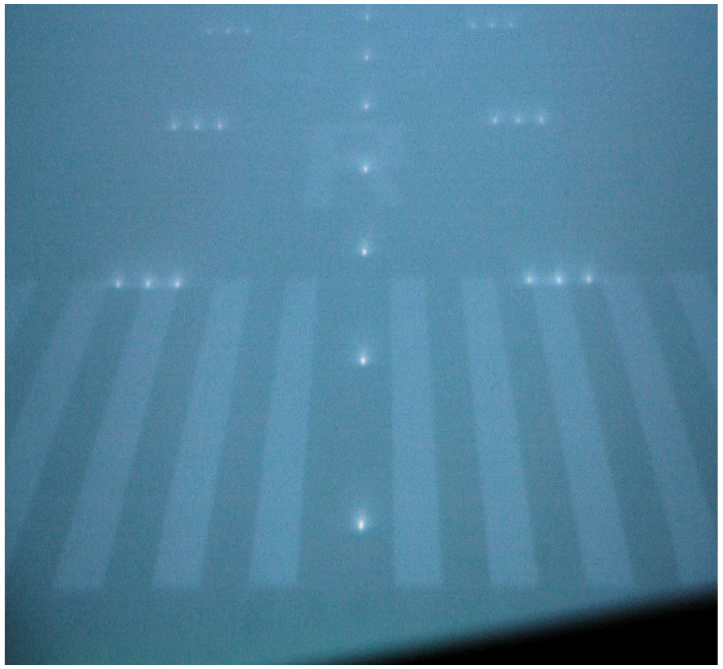
#6 Operator Qualification

# #1 LVO Concept

**Concept** **Regulations** **Airport** **Aircraft** **Flight crew** **Operator**

# The LVO concept

**LVO objective:**
**Provide level of safety in low visibility conditions equivalent to « normal » operating conditions.**



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# The LVO concept

## The Airline Perspective



Airline Approval

State of the Operator

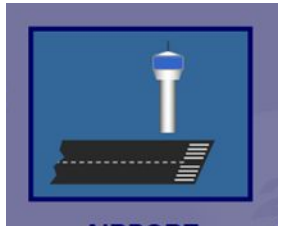
Aircraft Capability

State of the TC holder

Crew Capability

State of the license holder

State of the Operator



Airport Requirements

State of the Aerodrome



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# The LVO concept

## LVO Definition

**Approach Operations**
**RVR < 550m**
**DH < 200ft**

**Take-off Operations**
**RVR < 400m**




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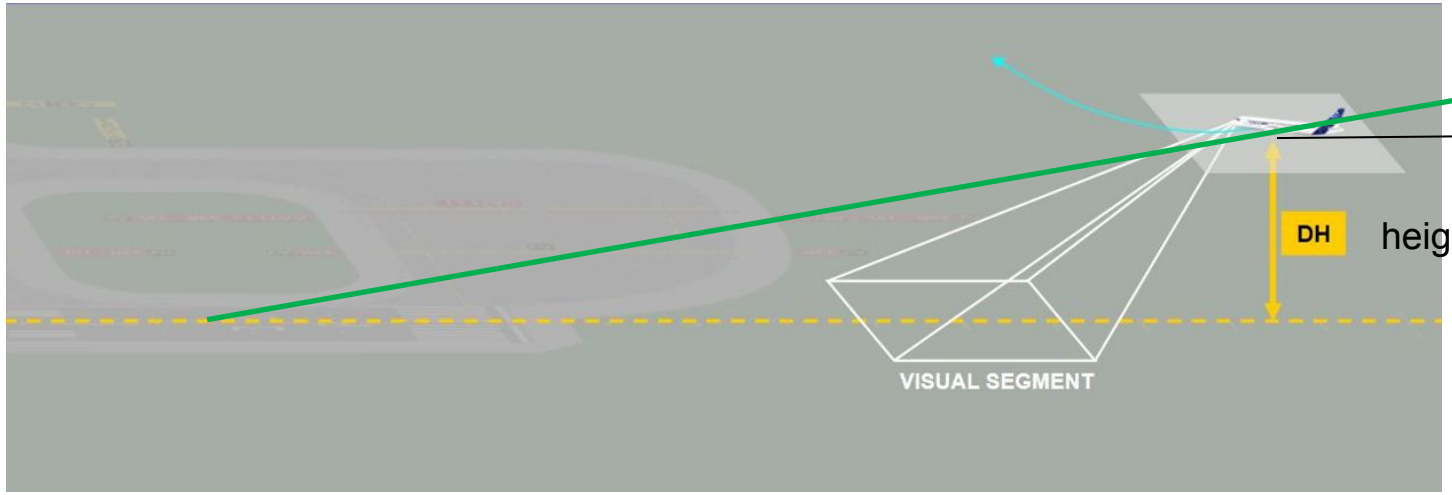
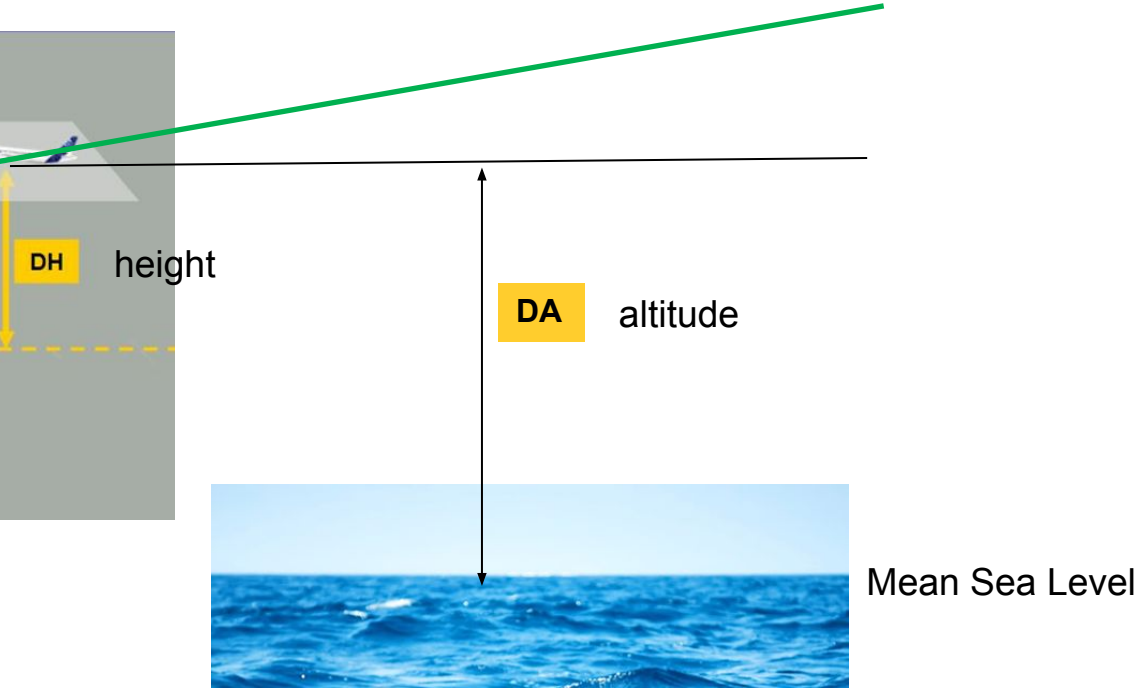
# The LVO concept

## The DA – DH concept

**DA: Decision Altitude ⇒ Barometric Altitude ⇒ CAT I**

**DH: Decision Height ⇒ Radio-altimeter Altitude ⇒ CAT II / CAT III LVO**



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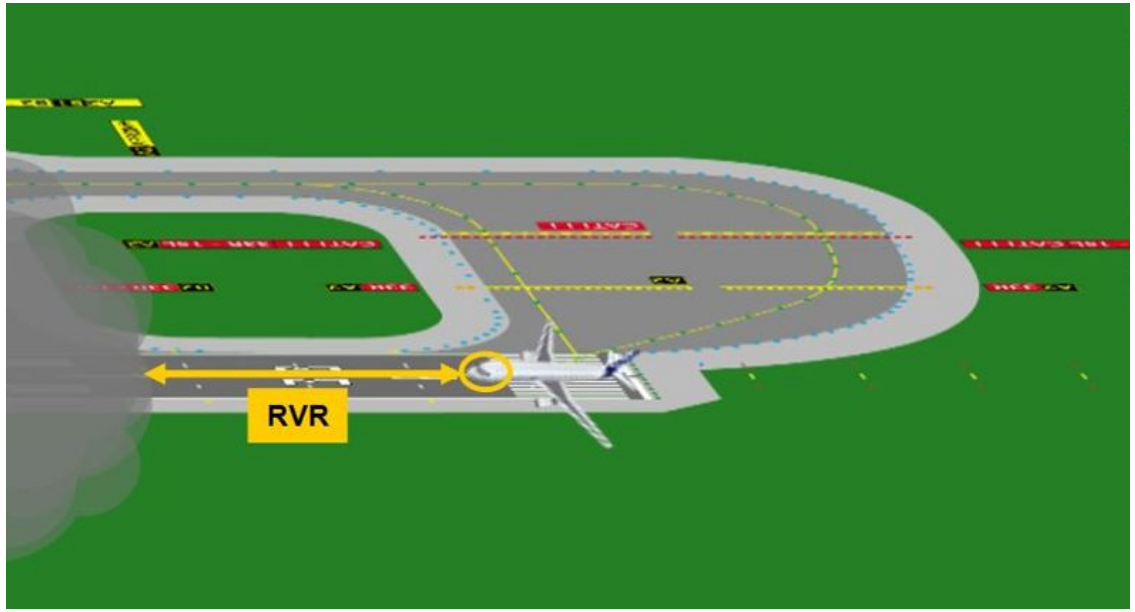
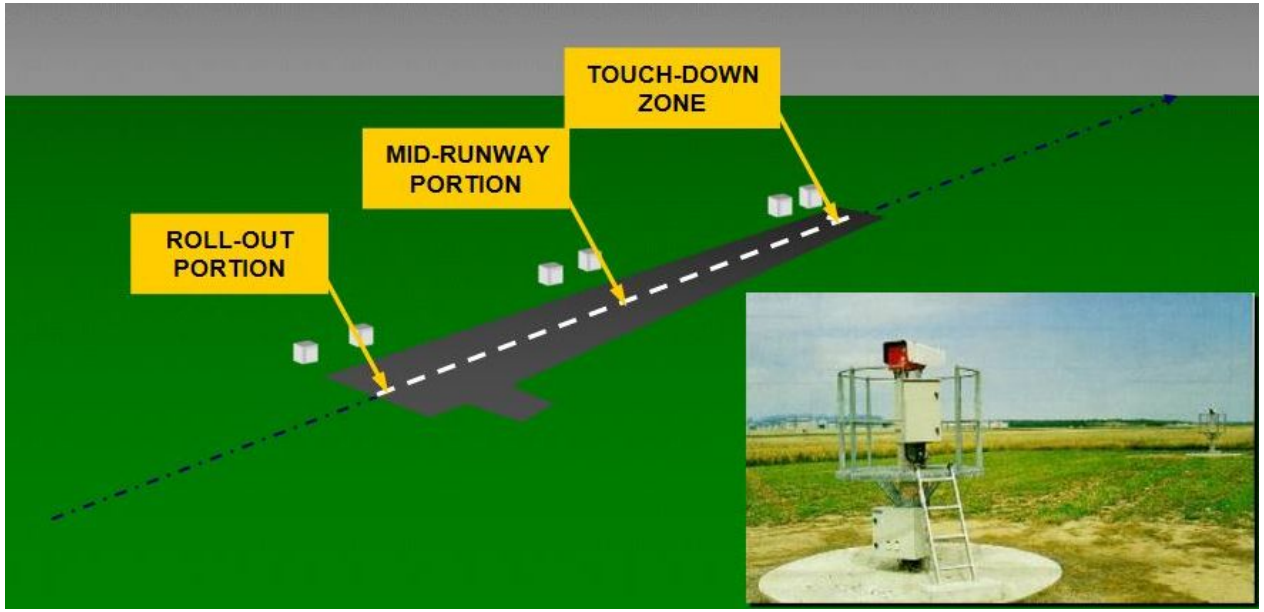
# The LVO concept

## The RVR concept

**RVR: Runway Visual Range**



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# ICAO classification



## Type A
Minima ≥ 250ft

### 2D
Lateral

**NPA**
Non Precision Approach

- Conventional VOR/DME NDB LOC only
- RNP APCH
- LNAV
- LP

### 3D
Lateral and Vertical

**APV**
Approach with Vertical Guidance

- RNP APCH
- RNP AR APCH
- LNAV/VNAV
- RNP 0.XX
- LPV

## Type B
Minima < 250ft

### 3D
Lateral and Vertical

**PA**
Precision Approach

- RNP APCH
- GLS
- Conventional ILS MLS
- LPV 200
- CAT I
- CAT II CAT III
- CAT I
- CAT II CAT III



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# The LVO concept

## PA Instrument approach operations categorization

| | DH | VIS | RVR |
|---|---|---|---|
| CAT I | ≥ 200 ft | ≥ 800 m | ≥ 550 m |
| CAT II | < 200 ft and ≥ 100 ft | | ≥ 300 m |
| CAT III A | < 100 ft or NO DH | | ≥ 175 m |
| CAT III B | < 50 ft or NO DH | | ≥ 50 m but < 175 m |
| CAT III C | No | | No limitation |

OLD

# The LVO concept

**Instrument approach operations classification**

| | | DH | VIS | RVR |
|---|---|---|---|---|
| Type A | | DH ≥ 250 ft | | |
| Type B | CAT I | DH ≥ 200 ft | VIS ≥ 800 m | RVR ≥ 550 m |
| | CAT II | 200 ft > DH ≥ 100 ft | | RVR ≥ 300 m |
| | CAT III | DH < 100 ft or NO DH | | RVR < 300 m or no limit |

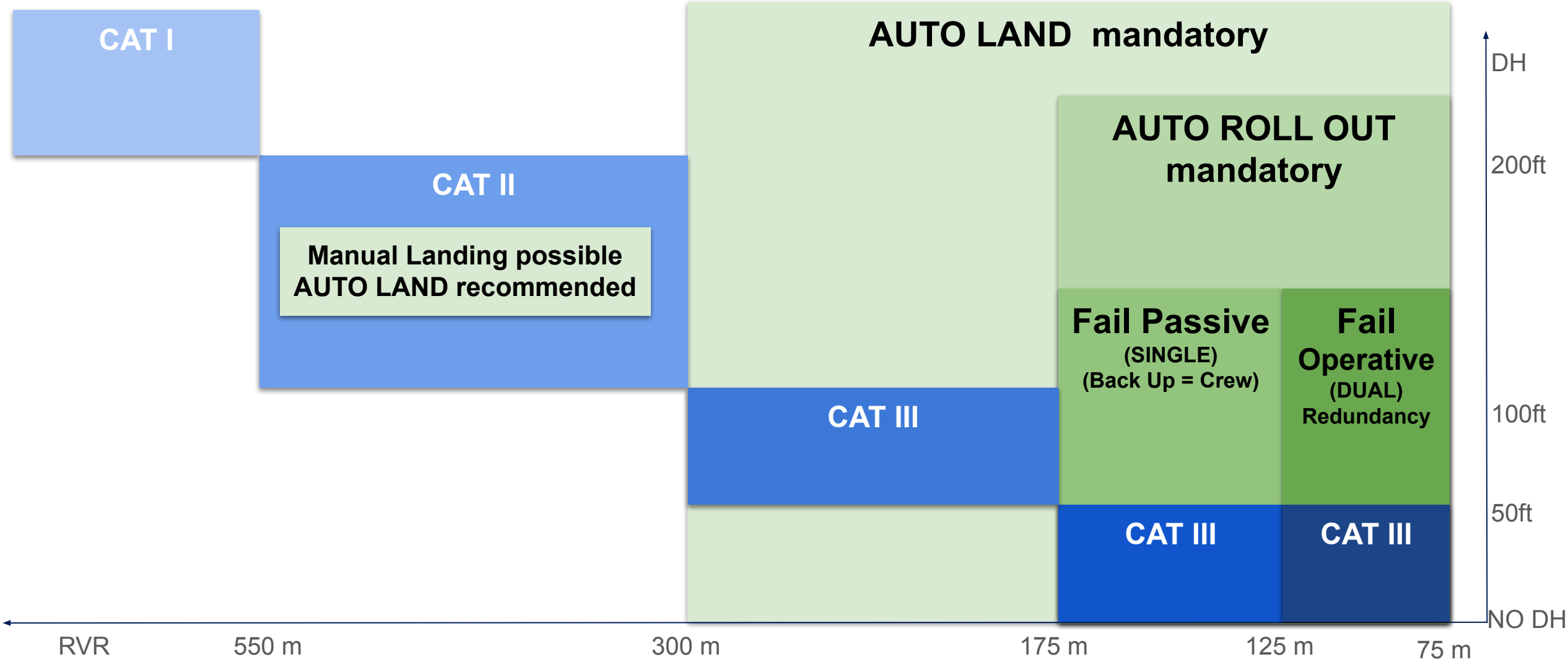
# The LVO concept

**CAT III operation Minima**

| DH | Roll-out control / guidance system | RVR |
|---|---|---|
| 100 ft > DH ≥ 50 ft | Not required | 175 m |
| DH < 50 ft or NO DH | Fail-passive | 125 m |
| DH < 50 ft or NO DH | Fail-operational | 75 m |

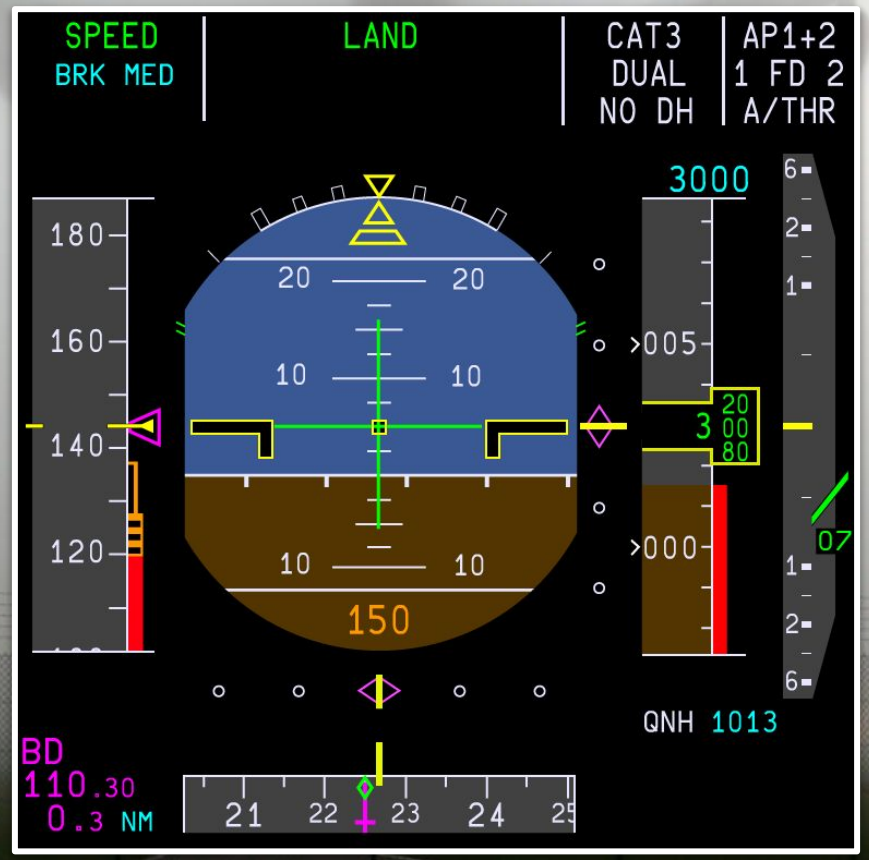
[ Airbus Amber ]

# The LVO concept - Applicability to Airbus A/C

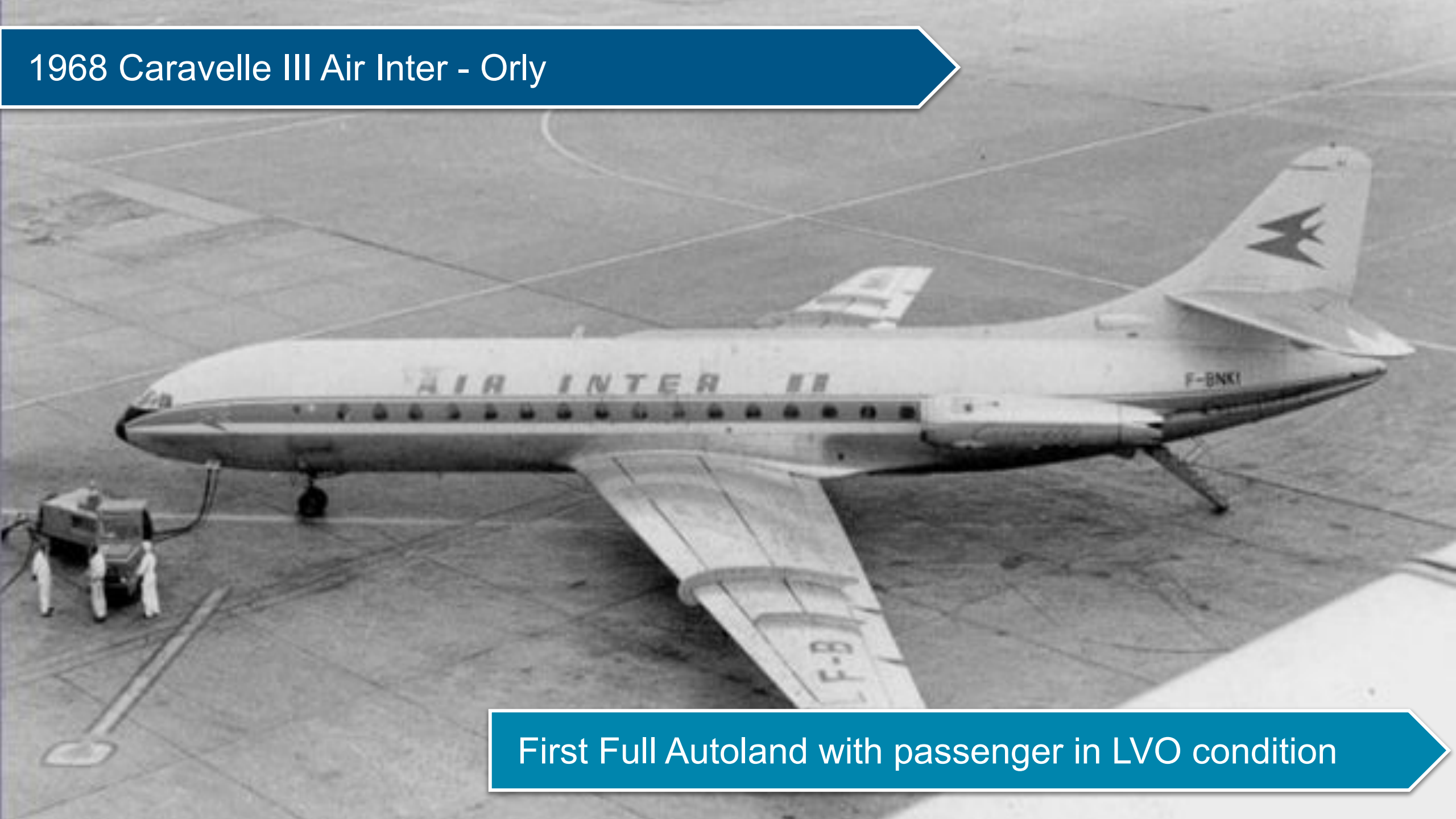


## Until Now

# LVO = ILS + AUTOLAND



# 1968 Caravelle III Air Inter - Orly




First Full Autoland with passenger in LVO condition

# #2 LVO Regulations

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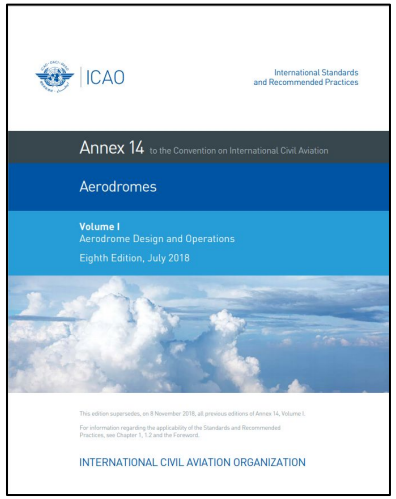
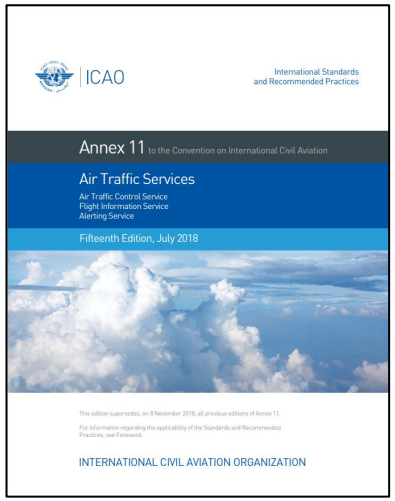
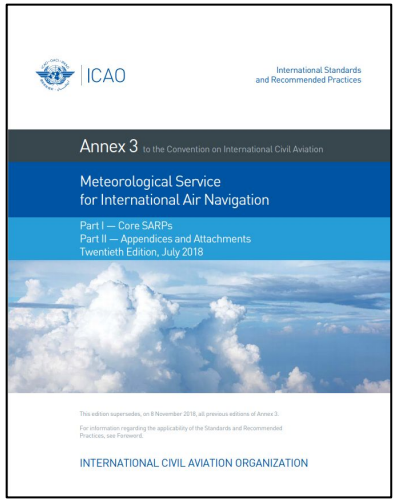
# The Regulations

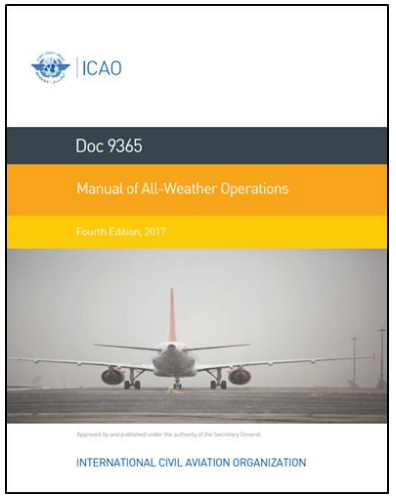
## Worldwide - ICAO





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# The Regulations

## National Aviation Authorities

EASA
European Aviation Safety Agency

Federal Aviation Administration



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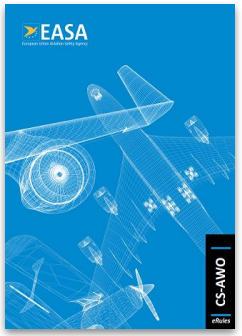
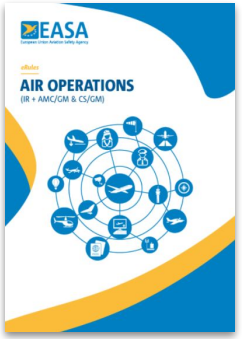
# EASA Rules CS-AWO + AIR OPS Part SPA




**CS-AWO** **For the OEM**

**Capability** and **demonstrated performances** must be provided in Ops documentation (AFM)




**AIR OPS** **For the Operator**

The Operator can use OEM data for its approval



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# Change in EASA CS-AWO Issue 2

## Issue 1

### Type of Operations

- ILS CAT II
- ILS CAT III

### Enabling Systems

- For CAT III Autoland (*Airbus Standard*)
- For CAT II or III HUD (*Not used on Airbus*)

**New Regulation**

## Issue 2 (2022)

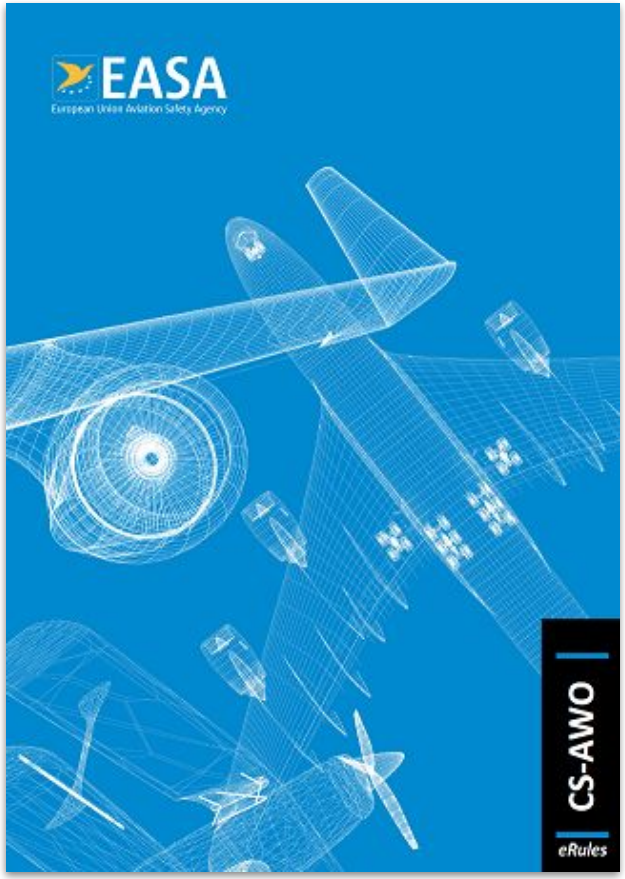
### Type of Operations

- **x**LS SA CAT I
- **x**LS CAT II
- **x**LS SA CAT II
- **x**LS CAT III

### Enabling Systems

- Autoland
- HUD
- **EFVS**
- **SVGS**

Source: CS-AWO Issue 2 *(31 Jan 2022)*




HUD: Head Up Display
SA: Special Approval
EFVS: Enhanced Flight Vision System
SGVS: Synthetic Guidance Vision System



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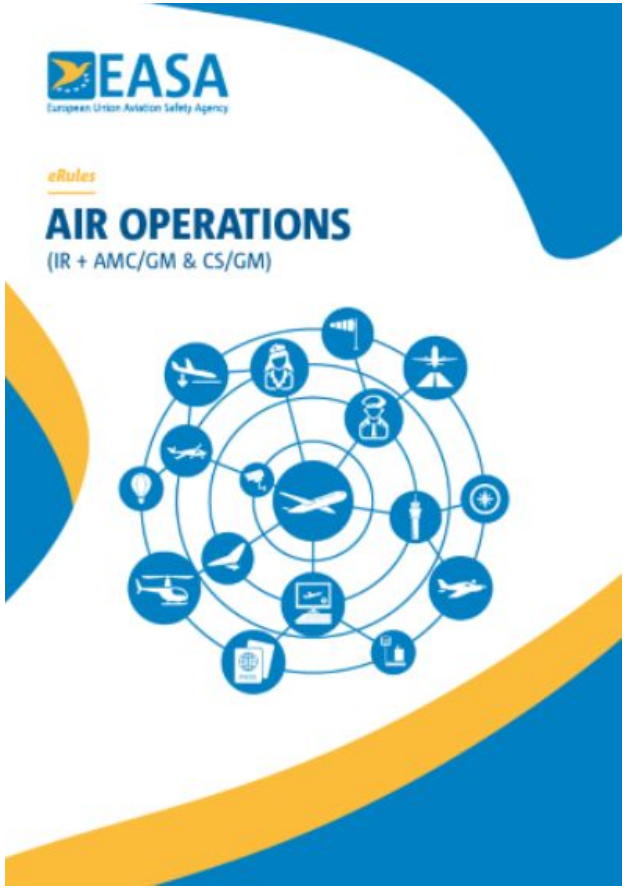
# AIR OPS Part-SPA Subpart E LVO new issue 2022




**SUBPART E : LOW-VISIBILITY OPERATIONS (LVOS) AND OPERATIONS WITH OPERATIONAL CREDITS**

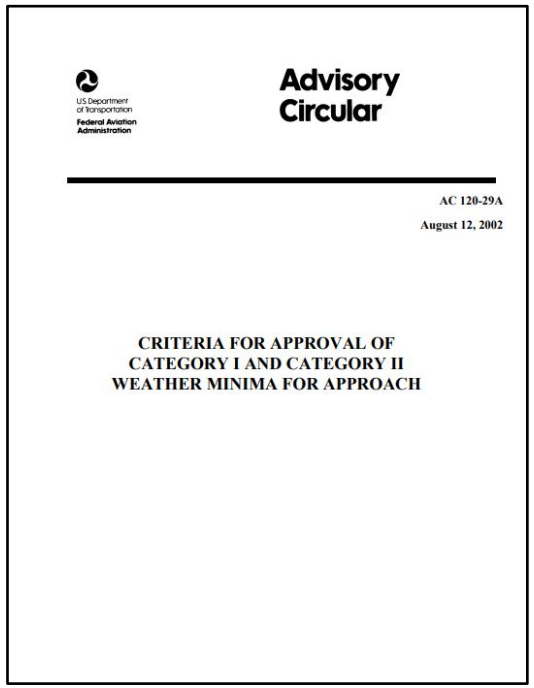
- **SPA.LVO.100 Low-visibility operations and operations with operational credits**
- **SPA.LVO.105 Specific approval criteria**
- **SPA.LVO.110 Aerodrome-related requirements, including flight procedures**
- **SPA.LVO.120 Flight crew competence**
- **SPA.LVO.125 Operating procedures**
- **SPA.LVO.130 Minimum equipment**

# The Regulations

Federal Aviation Administration

[ Airbus Amber ]

**AC 120-29A**



U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

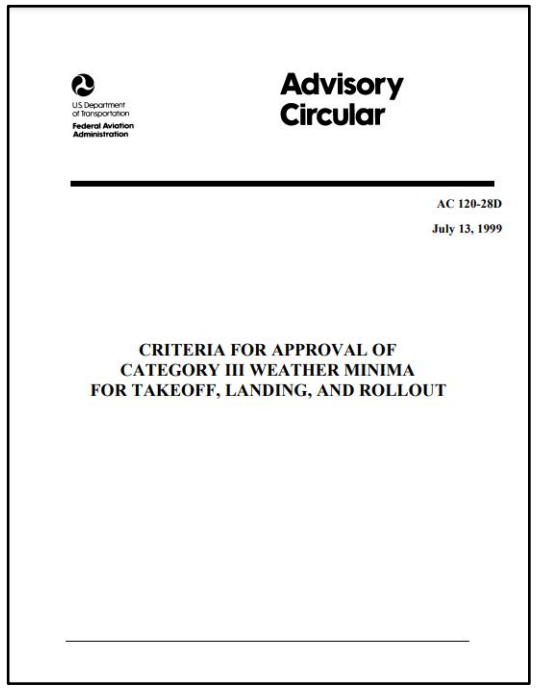
AC 120-29A

August 12, 2002

CRITERIA FOR APPROVAL OF
CATEGORY I AND CATEGORY II
WEATHER MINIMA FOR APPROACH

**CAT I CAT II**

**AC 120-28D**



U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

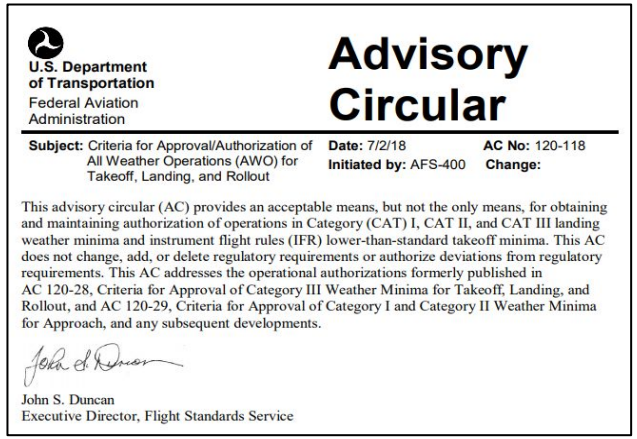
AC 120-28D

July 13, 1999

CRITERIA FOR APPROVAL OF
CATEGORY III WEATHER MINIMA
FOR TAKEOFF, LANDING, AND ROLLOUT

**CAT III**

**AC 120-118**



U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

**Subject:** Criteria for Approval/Authorization of All Weather Operations (AWO) for Takeoff, Landing, and Rollout

**Date:** 7/2/18 **AC No:** 120-118
**Initiated by:** AFS-400 **Change:**

This advisory circular (AC) provides an acceptable means, but not the only means, for obtaining and maintaining authorization of operations in Category (CAT) I, CAT II, and CAT III landing weather minima and instrument flight rules (IFR) lower-than-standard takeoff minima. This AC does not change, add, or delete regulatory requirements or authorize deviations from regulatory requirements. This AC addresses the operational authorizations formerly published in AC 120-28, Criteria for Approval of Category III Weather Minima for Takeoff, Landing, and Rollout, and AC 120-29, Criteria for Approval of Category I and Category II Weather Minima for Approach, and any subsequent developments.

John S. Duncan
Executive Director, Flight Standards Service



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# LVO - Regulations

## LVO capability

**Airport Facilities**

**A/C Capability**

**Crew's capability**

**Operator's qualification**



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# #3 Airport Facilities

**Concept** **Regulations** **Airport** **Aircraft** **Flight crew** **Operator**



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# LVO - Airport Facilities

**LVO capability**

## Airport Facilities

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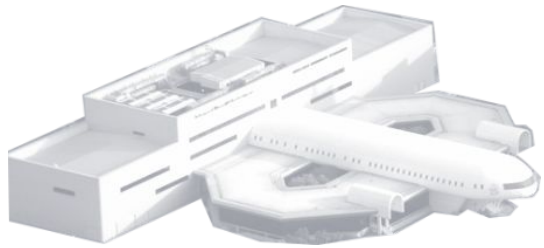
**A/C Capability**

\+

## Crew's capability

\+



**Operator's qualification**



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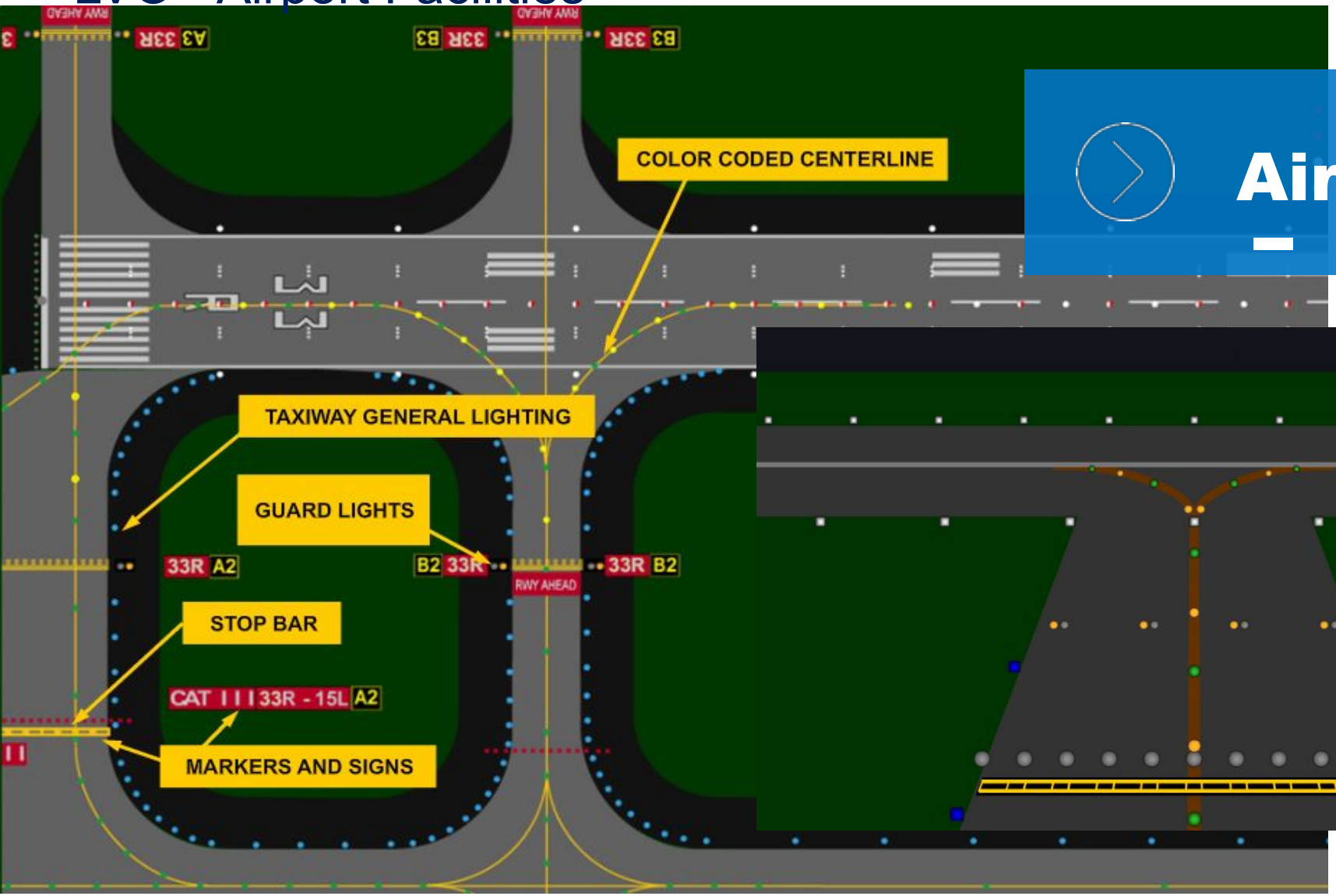
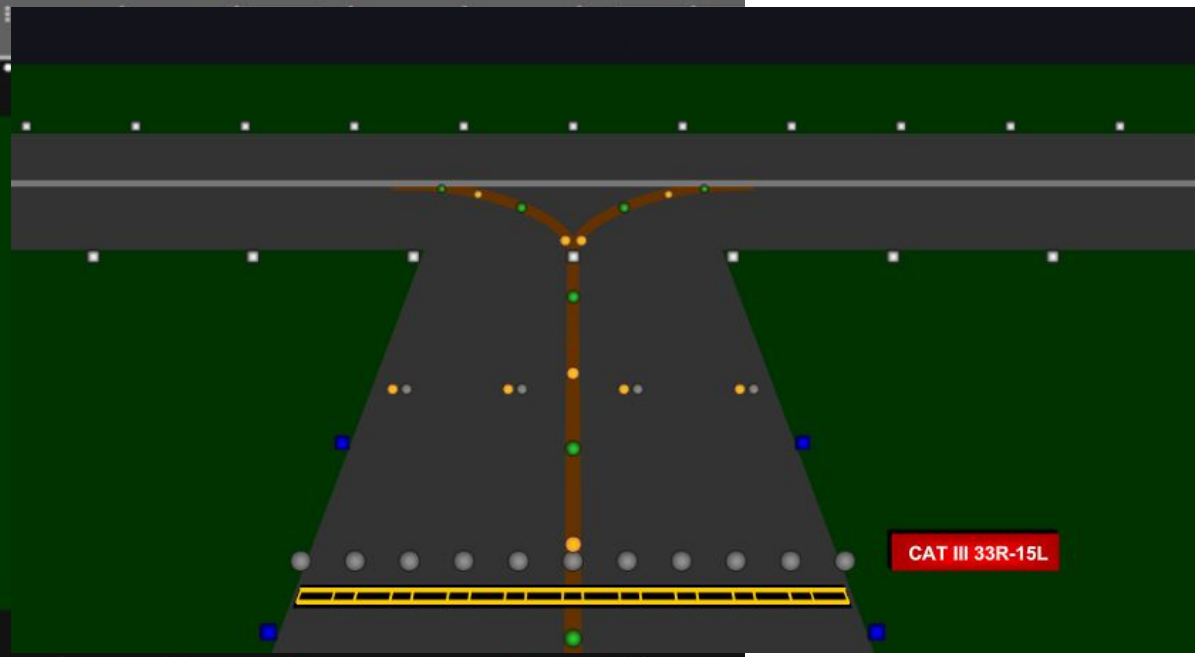
# LVO - Airport Facilities

## Airfield CAT II/III



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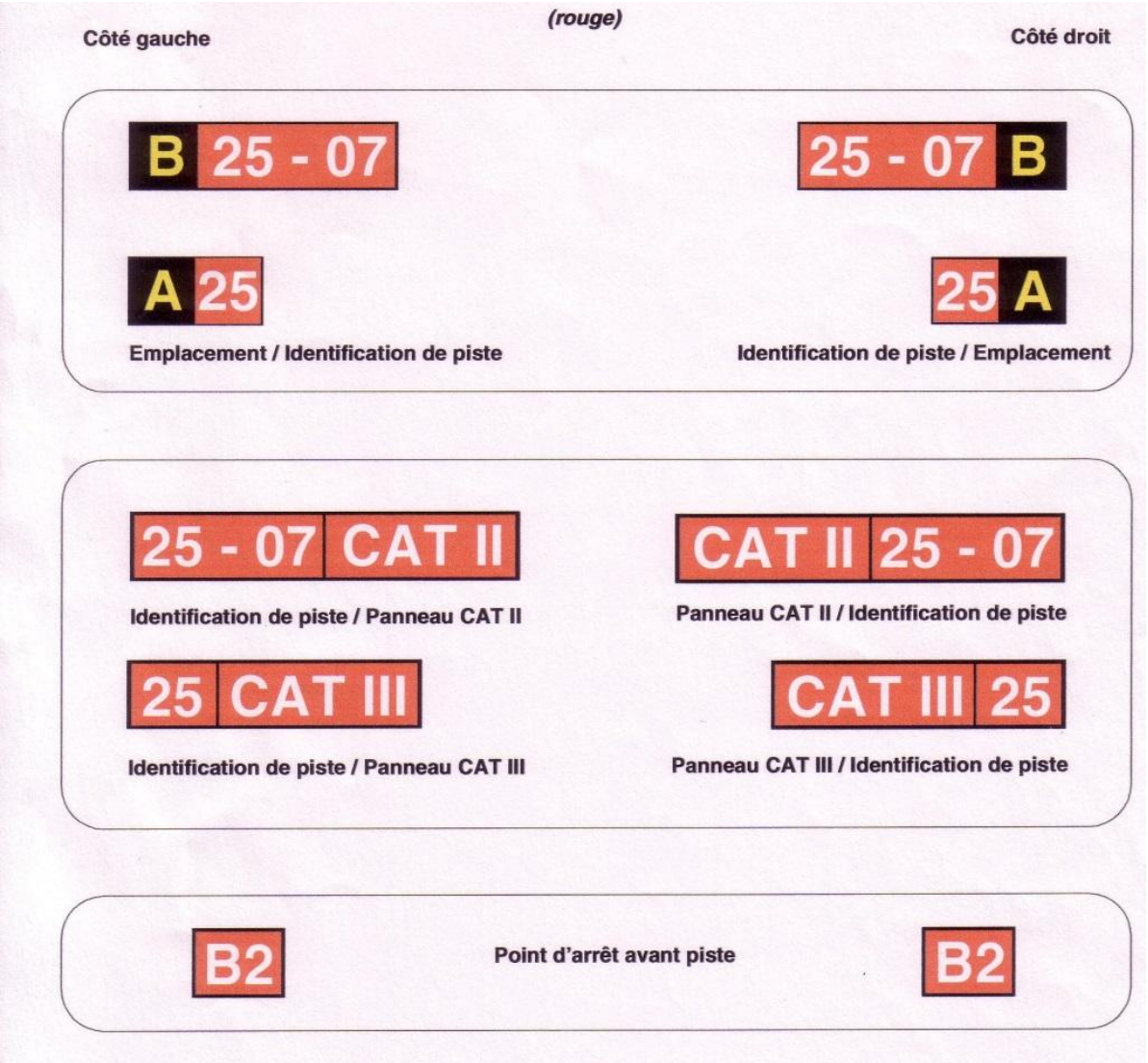
# LVO - Airport Facilities




## Airfield CAT II/III



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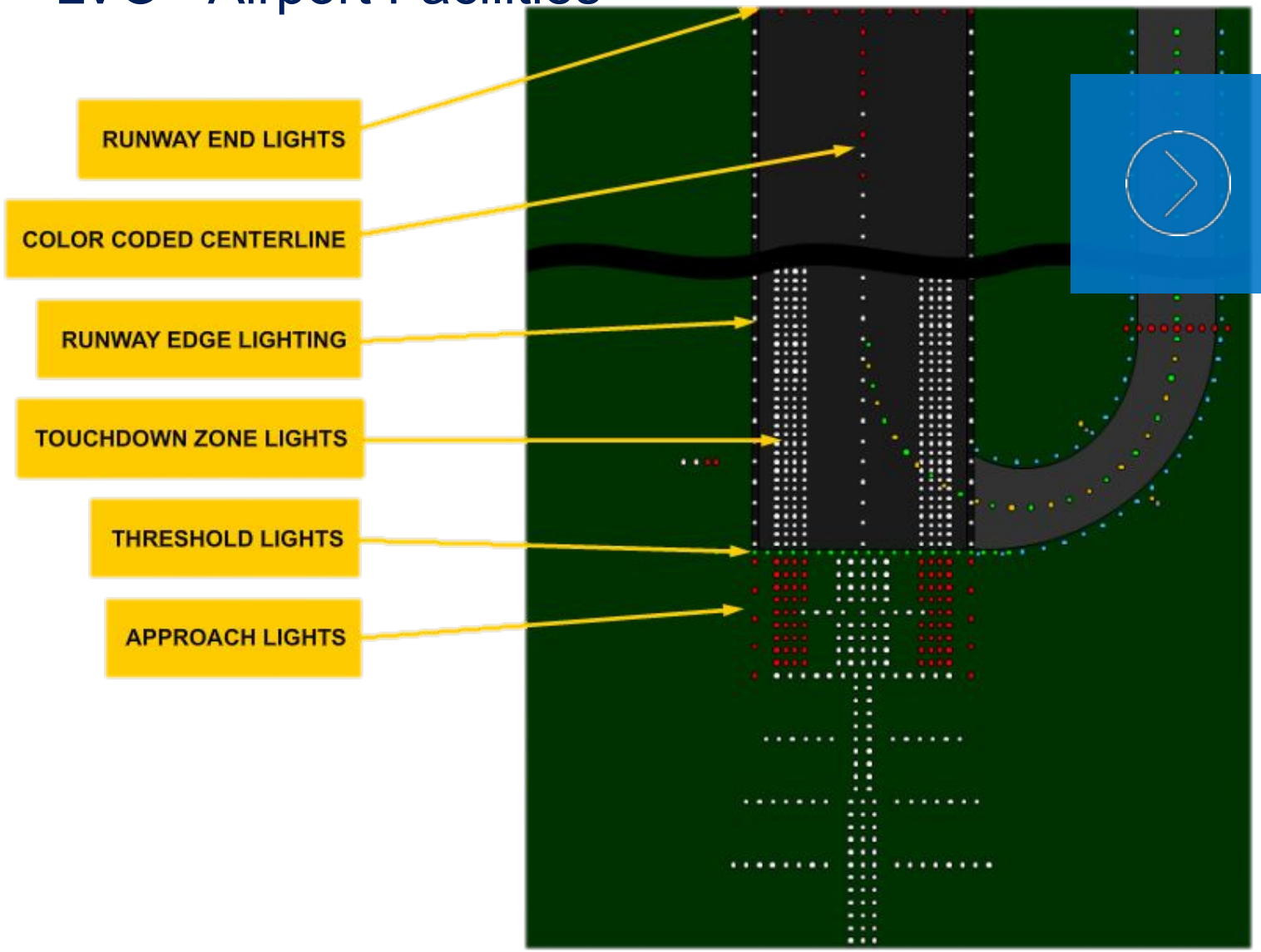
# LVO - Airport Facilities




## Runway Marking and lightings



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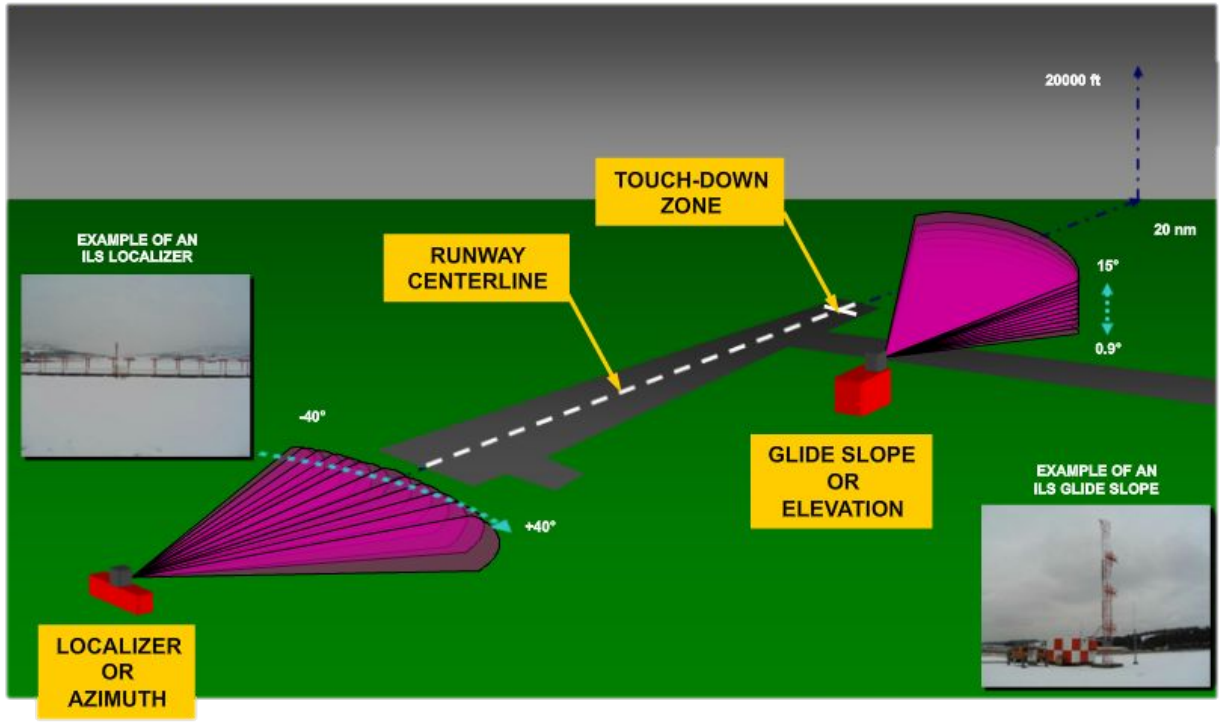
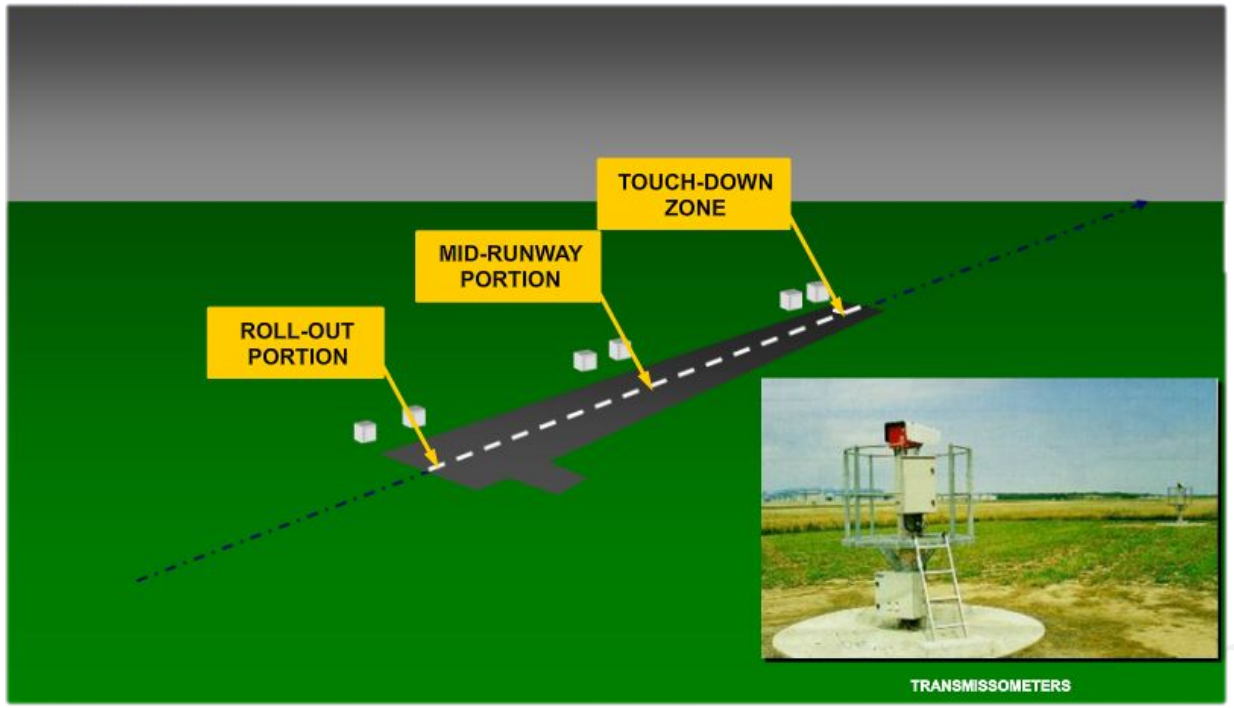
# LVO - Airport Facilities

## Runway Equipment



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# #4 Aircraft capability

Concept Regulations Airport **Aircraft** Flight crew Operator



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# LVO – Aircraft capabilities

**LVO capability**

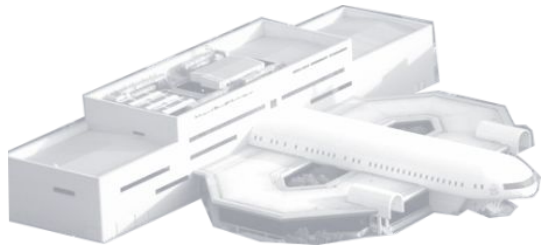
## Airport Facilities

+

+

## Crew's capability

+



**A/C Capability**

**Operator's qualification**



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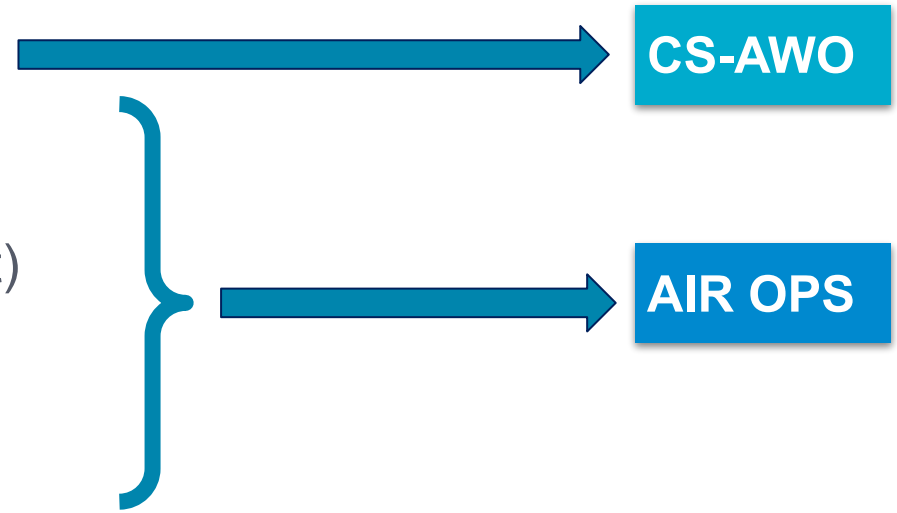
# LVO – Aircraft capabilities

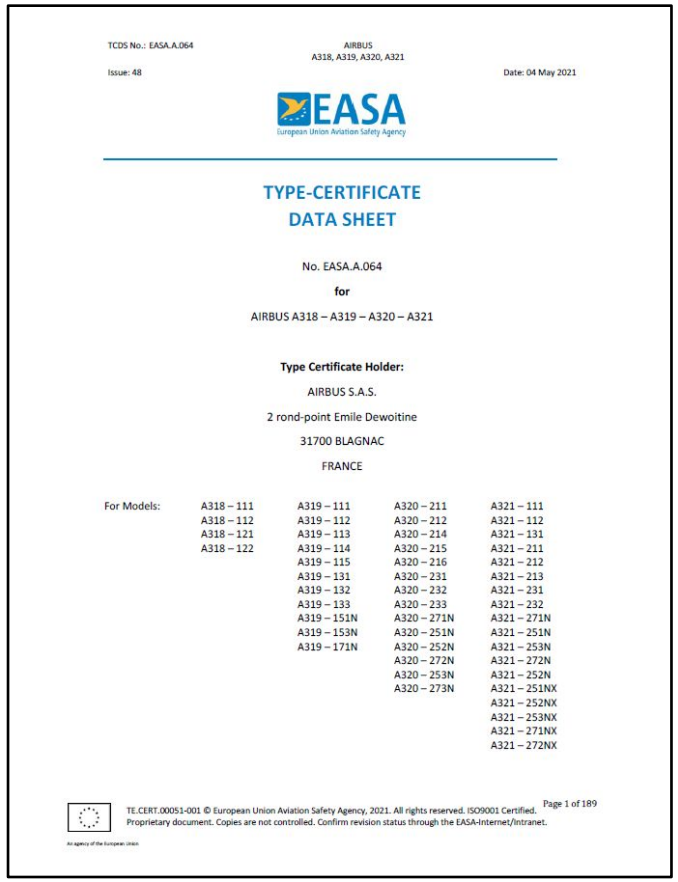
## Aircraft documentation

- **AFM** (Airplane Flight Manual)
- **FCOM** (Flight Crew Operating Manual)
- **MMEL** (Master Minimum Equipment List)
- **QRH** (Quick Reference Handbook)
- **FCTM** (Flight Crew Techniques Manual)



# LVO - Aircraft Capability

## The Certification Basis



TCDS No.: EASA.A.064
Issue: 48

AIRBUS
A318, A319, A320, A321

Date: 04 May 2021

EASA
European Union Aviation Safety Agency

**TYPE-CERTIFICATE DATA SHEET**

No. EASA.A.064

**for**

AIRBUS A318 – A319 – A320 – A321

**Type Certificate Holder:**

AIRBUS S.A.S.

2 rond-point Emile Dewoitine

31700 BLAGNAC

FRANCE

| For Models: | | | | |
|---|---|---|---|---|
| | A318 – 111 | A319 – 111 | A320 – 211 | A321 – 111 |
| | A318 – 112 | A319 – 112 | A320 – 212 | A321 – 112 |
| | A318 – 121 | A319 – 113 | A320 – 214 | A321 – 131 |
| | A318 – 122 | A319 – 114 | A320 – 215 | A321 – 211 |
| | | A319 – 115 | A320 – 216 | A321 – 212 |
| | | A319 – 131 | A320 – 231 | A321 – 213 |
| | | A319 – 132 | A320 – 232 | A321 – 231 |
| | | A319 – 133 | A320 – 233 | A321 – 232 |
| | | A319 – 151N | A320 – 271N | A321 – 271N |
| | | A319 – 153N | A320 – 251N | A321 – 251N |
| | | A319 – 171N | A320 – 252N | A321 – 253N |
| | | | A320 – 272N | A321 – 272N |
| | | | A320 – 253N | A321 – 252N |
| | | | A320 – 273N | A321 – 251NX |
| | | | | A321 – 252NX |
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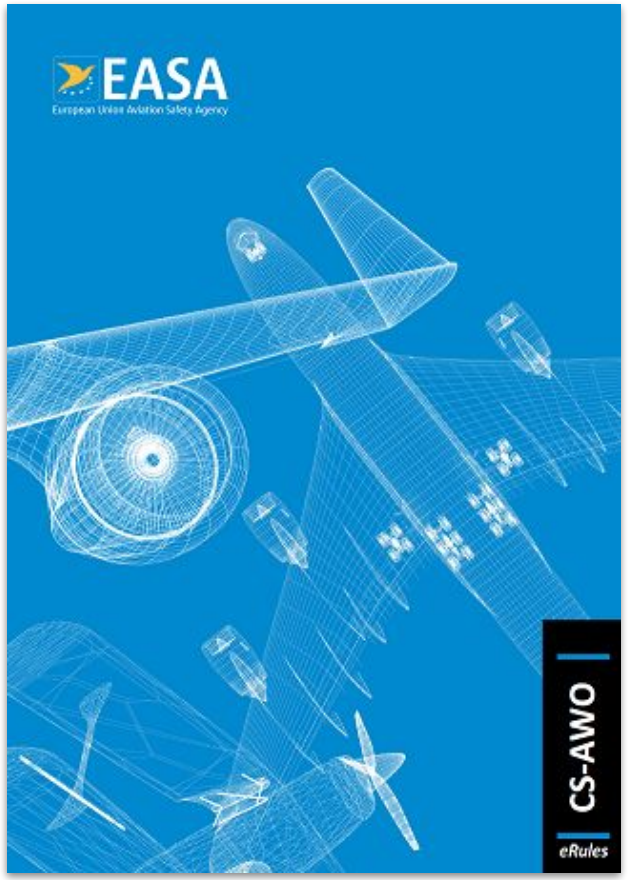
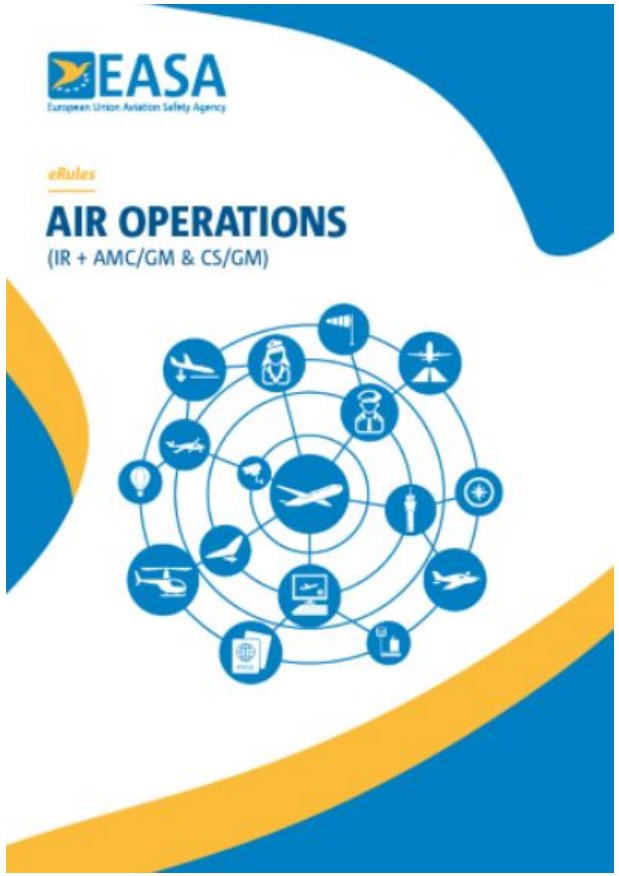
| | | | | A321 – 271NX |
| | | | | A321 – 272NX |







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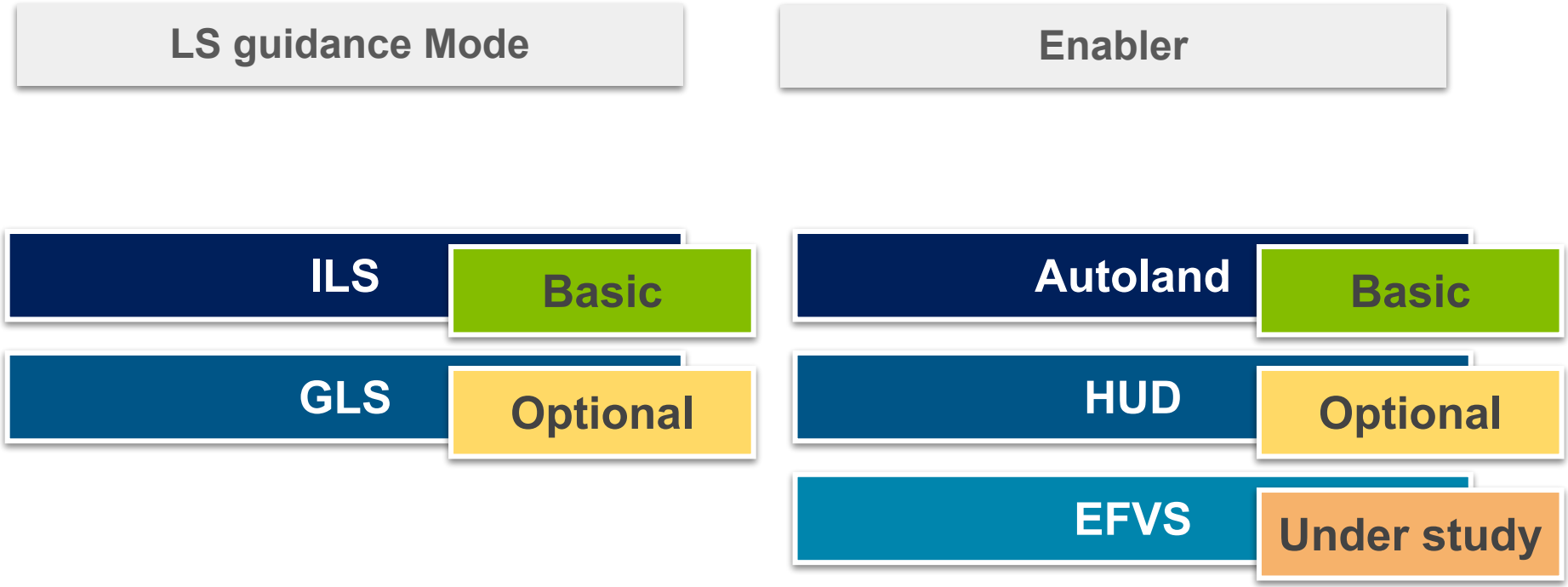
# LVO - Aircraft Capability

Available technology on Airbus A/C



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# Airbus aircraft capability : CAT II / III minima with AUTOLAND


## Basic on Airbus

- **No additional modification**



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# LVO – Aircraft capabilities

**Autoland function**

Airworthiness compliance based on the regulation at the time of the A/C certification

JAR AWO / JAR 25

⇒ CS-AWO issue 1 / CS-25

⇒ CS-AWO issue 2 / CS-25

AC 120-29 / AC 120-28C

⇒ AC 120-29A AC120-28D

⇒ AC 120-118

# LVO – Aircraft capabilities

## Airworthiness demonstration, statement of compliance in **AFM LIM/22-AFS/FG**

A320
A330
A380

AFM

**AIRWORTHINESS STANDARDS COMPLIANCE**

Ident.: LIM-22-FGS-00009235.0001001 / 23 NOV 09 APPROVED
Criteria: SA

The Flight Management and Guidance System (FMGS) with the associated equipment has been found to meet the airworthiness requirements and performance criteria of:
- JAR 25
- ACJ 25.1329 for automatic flight system
- JAR AWO Subpart 1 - Automatic landing systems
- JAR AWO Subpart 2 - Category 2 operations
- JAR AWO Subpart 3 - Category 3 operations.

Note: *Compliance with the standards noted above does not constitute an approval to conduct category II or III operations. Such authorization must be obtained by the operator from the appropriate authorities.*

EASA European Aviation Safety Agency

**AIRWORTHINESS STANDARDS COMPLIANCE**

Ident.: LIM 22 FGS 00009235.0003001 / 23 NOV 09 APPROVED
Criteria: (A319 or A320 or A321)
Specific: FAA

The Flight Management and Guidance System (FMGS) with the associated equipment has been found to meet the airworthiness requirements and performance criteria of:
- AC 25.1329-1A for automatic flight system
- AC 20.57 for autoland
- AC 120-29 for Category II approaches
- AC 120-28 C appendix 1 for Category III including rollout.

Note: *Compliance with the standards noted above does not constitute an approval to conduct category II or III operations. Such authorization must be obtained by the operator from the appropriate authorities.*

Federal Aviation Administration

A350

AFM

**AIRWORTHINESS STANDARDS COMPLIANCE**

Ident.: LIM-22-FGS-00018084.0001001 / 20 JUL 15 APPROVED
Criteria: XW

The Flight Guidance System (FGS) with the associated equipment has been found to meet the airworthiness requirements and performance criteria of:
- CS 25
- CS AWO

Note: *Compliance with the standards noted above does not constitute an approval to conduct category II or III operations. Such authorization must be obtained by the operator from the appropriate authorities.*

**AIRWORTHINESS STANDARDS COMPLIANCE**

Ident.: LIM-22-FGS-00018084.0001002 / 20 OCT 15 APPROVED
Criteria: XW
Specific: FAA

The Flight Guidance System (FGS) with the associated equipment has been found to meet the airworthiness requirements and performance criteria of:
- AC 25.1329-1B for automatic flight system
- AC 120-29A for Category I and Category II Approaches
- AC 120-28D for Category III and roll out
- AC 25-12 and AC 120-41 for windshear warning.

Note: *Compliance with the standards noted above does not constitute an approval to conduct category II or III operations. Such authorization must be obtained by the operator from the appropriate authorities.*



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# LVO – Aircraft capabilities

[ Airbus Amber ]

**The AFM**

AFM

**Modification planed in 2024**

**CAT II / CAT III OPERATIONS**

Ident.: LIM-22-FGS-00009243.0005001 / 23 NOV 09 — APPROVED
Criteria: (320-231 or 320-232 or 320-233)

**CATEGORY II AUTOMATIC APPROACH WITHOUT AUTOMATIC LANDING**

Minimum decision height: 100 ft
One autopilot at least must be engaged in APPR mode and CAT 2 or CAT 3 SINGLE or CAT 3 DUAL capability must be displayed on FMA.
Minimum height for AP disconnection: 80 ft

**CATEGORY II AUTOMATIC APPROACH WITH AUTOMATIC LANDING**

Minimum decision height: 100 ft
One autopilot at least must be engaged in APPR mode and CAT 2 or CAT 3 SINGLE or CAT 3 DUAL capability must be displayed on FMA.

**CATEGORY III FAIL PASSIVE (SINGLE) AUTOMATIC APPROACH AND AUTOMATIC LANDING**

Minimum decision height: 50 ft
One autopilot at least must be engaged in APPR mode and CAT 3 SINGLE or CAT 3 DUAL capability must be displayed on FMA.

**CATEGORY III FAIL OPERATIONAL (DUAL) AUTOMATIC APPROACH AND AUTOMATIC LANDING**

Alert height: 100 ft

- **CAT III with DH:**
  Minimum Approach Break-off Height: 25 ft AGL based on a demonstrated height loss from when TOGA is selected in a go-around and windspeeds of 5 kt tail, 15 kt head or below.
  Two autopilots must be engaged in APPR mode and CAT 3 DUAL capability must be displayed on FMA.
- **CAT III without DH:**
  Two autopilots must be engaged in APPR mode and CAT 3 DUAL capability must be displayed on FMA.
  Minimum Runway Visual Range (RVR): 75 m

**MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH OR AUTOMATIC LANDING AND AUTOMATIC ROLLOUT**

Headwind: 30 kt
Tailwind: 10 kt
Crosswind: 20 kt



AIRBUS

# LVO – Aircraft capabilities

AFM

## Example crosswind limitations

**Limitations**


Head Wind


Tail Wind


Cross Wind

| A300/A310 2.01.30 | A320 LIM 22.20 | A330 LIM 22.20 | A340-300 LIM 22.20 | A340-600 LIM 22.20 | A350 OIS | A380 OIS |
|---|---|---|---|---|---|---|
| • HW: 30 knots<br>• TW: 10 knots<br>• CW: 20 knots | • HW: 30 knots<br>• TW: 10 knots<br>• CW: 20 knots | • HW: 35 knots<br>• TW: 10 knots<br>• CW: 20 knots | • HW: 35 knots<br>• TW: 10 knots<br>• CW: 20 knots | • HW: 30 knots<br>• TW: 10 knots<br>• CW: 20 knots | • HW: 20 knots<br>• TW: 10 knots<br>• CW: 15 knots | • HW: 38 knots<br>• TW: 10 knots<br>• CW: 30 knots |

Values for information only



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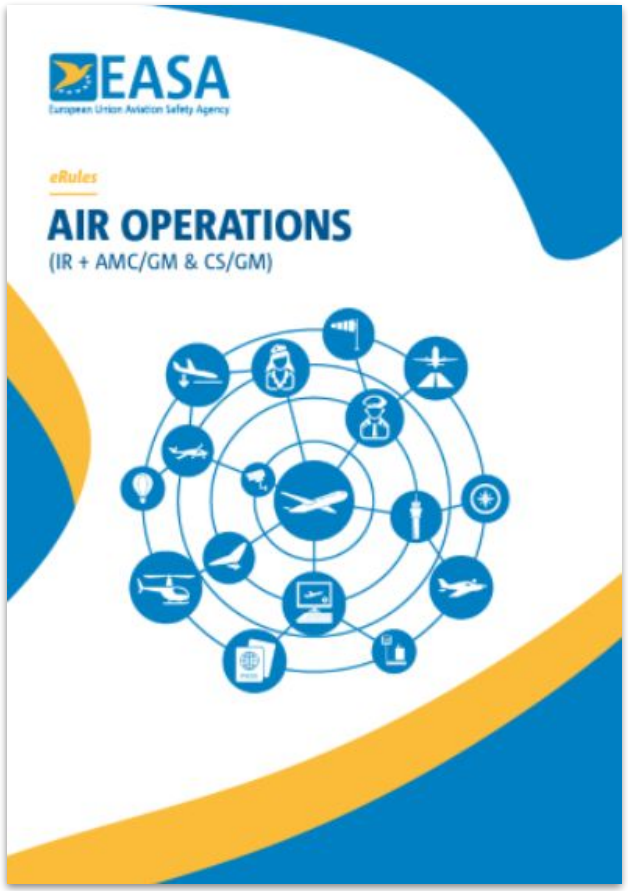
# LVO – Aircraft capability




**SUBPART E : LOW-VISIBILITY OPERATIONS (LVOS) AND OPERATIONS WITH OPERATIONAL CREDITS**

**SPA.LVO.125 Operating procedures**

operating procedure covered in Airbus Documentation

- **FCOM**
- **FCTM**
- **QRH**



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# LVO – Aircraft capabilities


## FCOM procedures

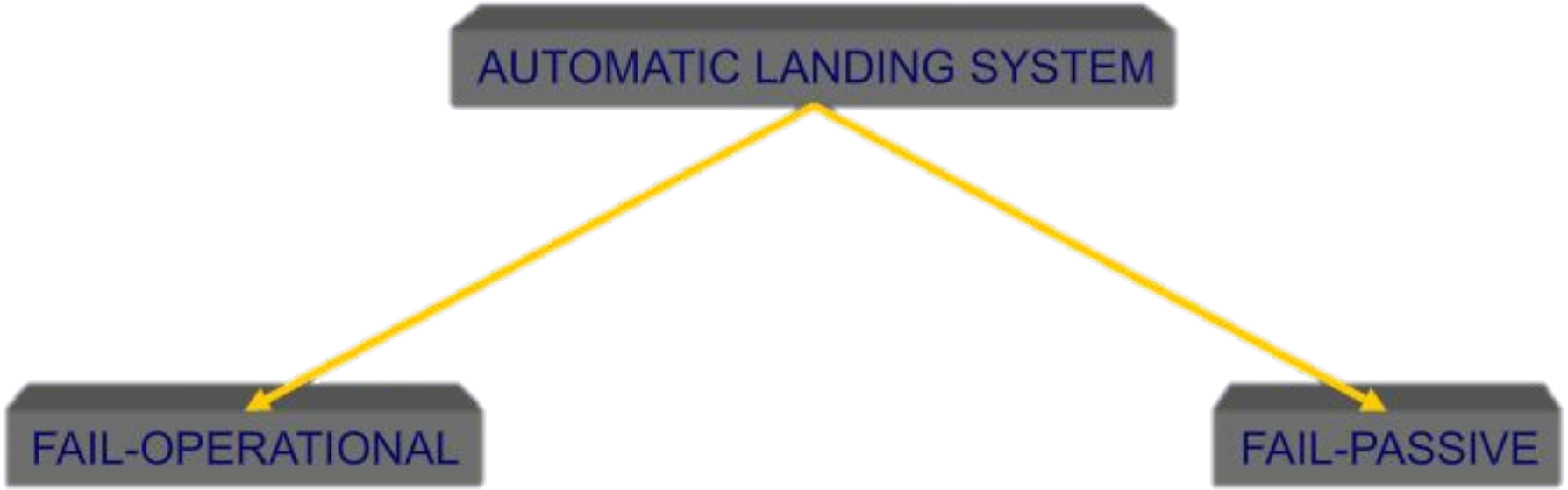
- Functional description / controls and indicators
- Aircraft limitations
- Task sharing
- Normal procedures
- Abnormal procedures

# LVO – Aircraft capabilities

FCOM

## Aircraft design For LVO

- **Example : Automatic landing mode for CAT III operations**



# LVO – Aircraft capabilities


## Fail-operational autoland

If Single Failure below alert height:
Approach, flare and landing can be completed by the remaining part of the automatic system (airbus both AP engaged)

AP: AutoPilot

# LVO – Aircraft capabilities


## Fail-passive autoland

If Single Failure
No significant out of trim condition, or deviation of flight path or attitude, but the landing is not completed automatically.
The minimum DH is 50 ft



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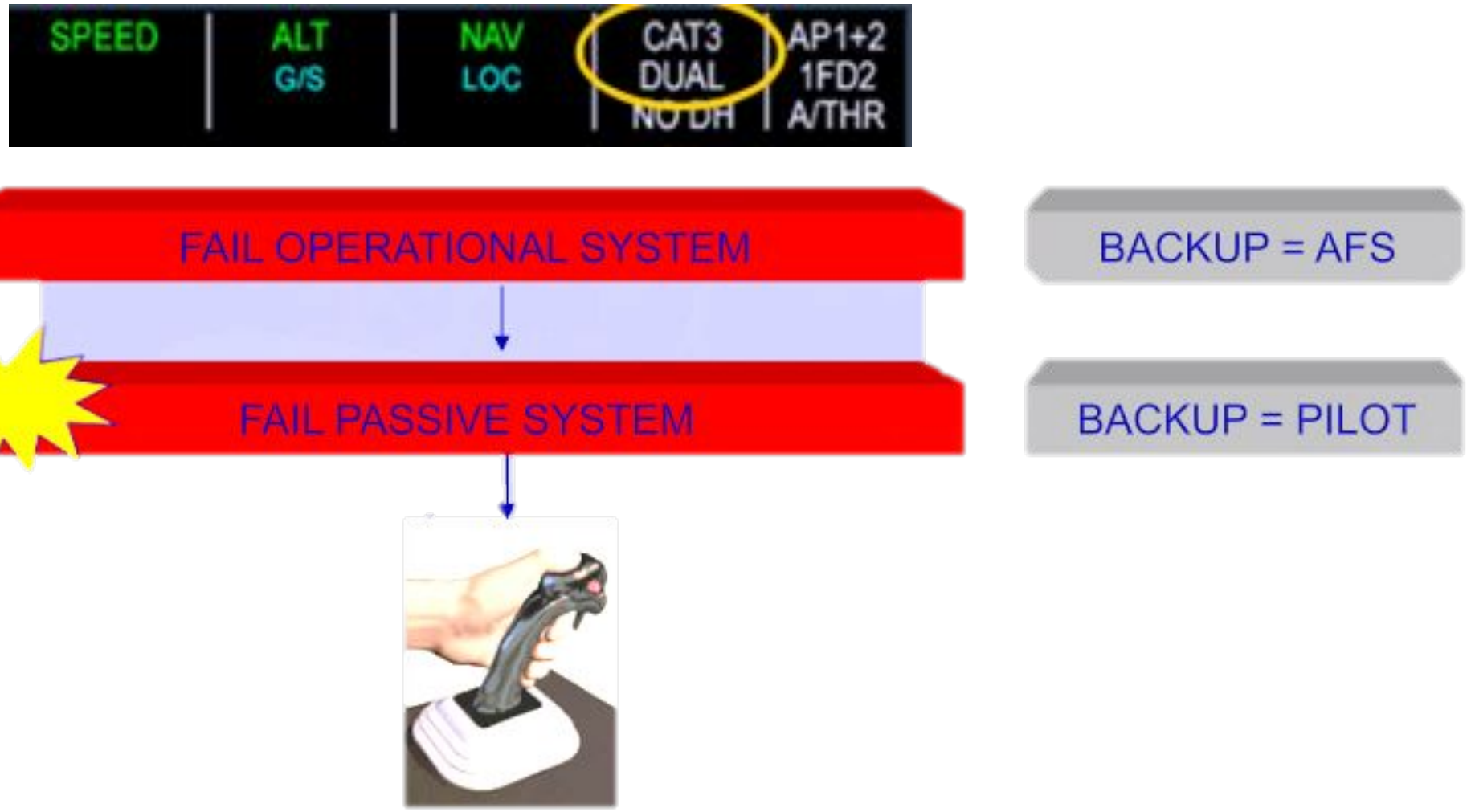
# LVO – Aircraft capabilities




AFS: Automatic Flight System

# LVO – Aircraft capabilities

## Required equipment to start

FCOM procedures

Path : FCOM / PRO / NOR / SOP / 180 / C / ... / APPROACH USING XLS GUIDANCE

**For CAT II / III:**

FLIGHT CREW QUALIFICATION AND CURRENCY ..... CHECK

AIRCRAFT TECHNICAL STATUS ..... CHECK

*Check:*

- *The technical logbook*
- *The MEL (as appropriate)*
- *The required equipment. For more information, Refer to Required Equipment for LAND 2(3) capability.*

AIRPORT STATUS ..... CHECK

*Review NOTAMs to check availability of ILS and runway and approach lighting.*

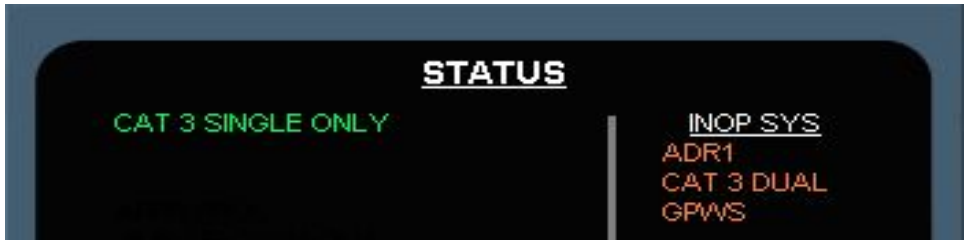
APPROACH BRIEFING ..... PERFORM

# LVO – Aircraft capabilities

**QRH**

Equipment failure: Most of the equipment failures are monitored by the FMGS
→ landing capability displayed on the

- **Status page**(if not CAT3 or LAND3 dual)
- **FMA** (once the APPR pb is pressed)




However, **some equipment failures are not monitored by the FMGS**.
When an ECAM or local caution occurs **=> use the QRH**



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# LVO – Aircraft capabilities

**QRH**

| REQUIRED EQUIPMENT FOR CAT2 AND CAT3 | | | | |
|---|---|---|---|---|
| | FMA CAPABILITY → / EQUIPMENT ↓ | CAT 2 (ILS) AUTOLAND (2) (GLS) | CAT 3 SINGLE | CAT 3 DUAL |
| FMGS MONITORED FOR FMA LDG CAPABILITY | AP | 1 AP ENGAGED | 1 AP ENGAGED | 2 AP ENGAGED |
| | AUTOTHRUST | 0 | 1 | 1 |
| | FMA | 1 | 2 | 2 |
| | A/THR CAUTION | 0 | 1 | 1 |
| | ELECTRICAL SUPPLY SPLIT (3) | 0 | 0 | 1 |
| | FAC | 1 | 1 | 2 |
| | ELAC | 1 | 1 | 2 |
| | YAW DAMPER/RUDDER TRIM | 1/1 | 1/1 | 2/2 |
| | HYDRAULIC CIRCUIT | 2 | 2 | 3 |
| | PFD | 2 | 2 | 2 |
| | FLIGHT WARNING COMPUTER | 1 | 1 | 2 |
| | BSCU CHANNEL | 1 (1) | 1 (1) | 1 |
| | ANTISKID (4) | 1 (1) | 1 (1) | 1 |
| | NOSEWHEEL STEERING (4) | 1 (1) | 1 (1) | 1 |
| | RADIO ALTIMETER | 1 (displayed on both sides) | 2 | 2 |
| | ILS RECEIVER (for ILS approach) | 2 | 2 | 2 |
| | GLS (2) RECEIVER (for GLS approach) | 2 | N/A | N/A |
| | BEAM EXCESSIVE DEVIATION WARNING | 1 for PM | 2 | 2 |
| | ATTITUDE INDICATION PFD | 2 | 2 | 2 |
| | ADR/IR | 2/2 | 2/2 | 3/3 |
| | AP DISCONNECT PB | 2 | 2 | 2 |
| | "AP OFF" ECAM WARNING | 1 | 1 | 2 |

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# LVO – Aircraft capabilities

[ Airbus Amber ]

## Aircraft Capability - Minimum Equipment for LVO

**SPA.LVO.130 Minimum equipment**

*Regulation (EU) No 965/2012*

# LVO – Aircraft capabilities

## The Minimum Equipment List (MEL) – before flight

**AUTOPILOT (AP)**

Flight preparation/Limitations

- **When one AP is inoperative:**

  For aircraft with the RNP AR capability, the following RNP AR operations are not permitted:
  - RNP AR operations strictly below 0.3 NM
  - RNP AR operations with a missed approach with an RNP value below 1 NM.

  Maximum landing capability is CAT 3 SINGLE.

- **When both APs are inoperative:**

  For aircraft with the RNP AR capability, RNP AR operations are not permitted.

  RVSM operations are not permitted.

  Maximum landing capability is CAT 1.

--- END ---



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# LVO – Aircraft capabilities

## FCTM

- Precision approach recommendations
- integrated in FCTM SOPs approach

# #5 Flight crew qualification

Concept | Regulations | Airport | Aircraft | **Flight crew** | Operator



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# LVO – Flight crew qualification

## LVO capability

**Airport Facilities**

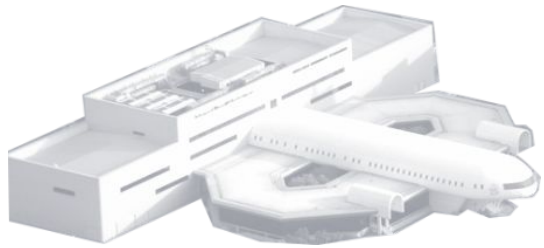
\+

**A/C Capability**

\+

**Crew's capability**

\+



**Operator's qualification**



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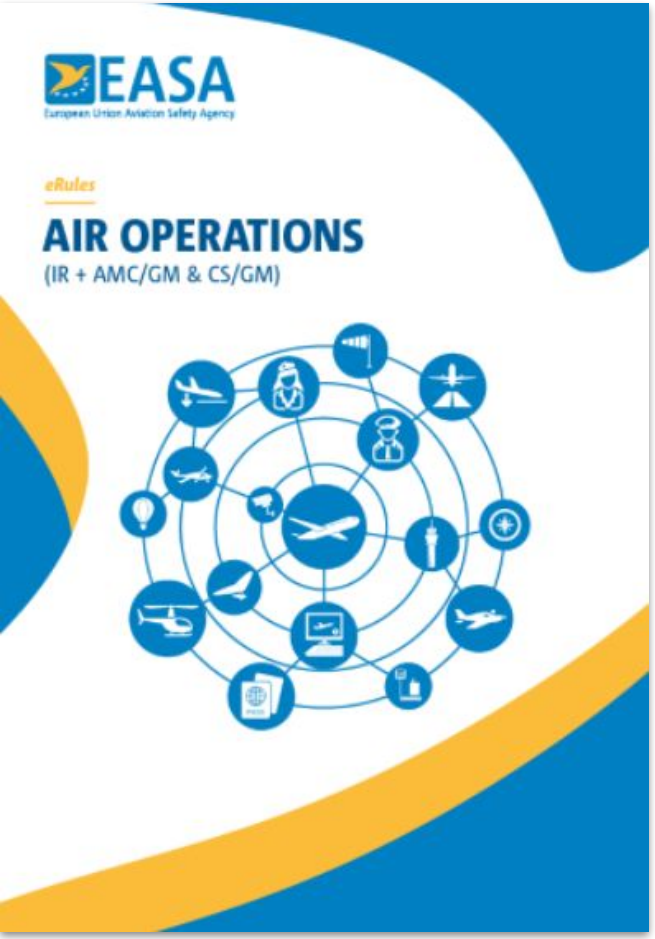
# LVO – Flight Crew qualification




## SUBPART E : LOW-VISIBILITY OPERATIONS (LVOS) AND OPERATIONS WITH OPERATIONAL CREDITS

### SPA.LVO.120 Flight Crew competence

| | |
|---|---|
| AMC1 SPA.LVO.120(a) | Risk Assessment |
| AMC2 SPA.LVO.120(a) | Competence and Recent experience EFVS |
| AMC3 SPA.LVO.120(a) | Competence and Recent experience |
| GM1 SPA.LVO.120(a) | Guidance to assess the competence and experience |
| AMC1 SPA.LVO.120(b) | Initial training LVTO |
| AMC2 SPA.LVO.120(b) | Initial training and checking SA CAT I, CAT II, SA CAT II, CAT III |
| AMC3 SPA.LVO.120(b) | Initial training and checking EFVS |
| AMC4 SPA.LVO.120(b) | Recurrent checking LVTO, SA CAT I, CAT II and CAT III |
| AMC5 SPA.LVO.120(b) | Difference training LVTO, SA CAT I, CAT II, SA CAT II and CAT III |
| AMC6 SPA.LVO.120(b) | Recurrent checking EFVS |
| AMC7 SPA.LVO.120(b) | Differences training EFVS |
| GM1 SPA.LVO.120(b) | Guidance on flight crew training |
| GM2 SPA.LVO.120(b) | Guidance on recurrent training and checking EFVS |
| GM3 SPA.LVO.120(b) | Guidance on initial training and checking SA CAT I, CAT II, SA CAT II, CAT III |

# The Flight Crew Qualification & Training

## General Provisions – LVO training

**AMC2 SPA.LVO.120(b) Flight crew competence**

### Initial Training

- Ground training
- FSTD training
- FSTD checking
- Line Flying under Supervision (LIFUS)

### Recurrent Training

- Ground training
- FSTD training


The flight crew qualification provisions are specific to the operator and the type of aircraft operated.



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# The Flight Crew Qualification & Training

## Ground Training Program is defined in:

**AMC2 SPA.LVO.120(b) Flight crew competence**

Extract:

- Characteristics of the visual aids
- Guidance on the visual cues required at DH
- Effect of specific aircraft/system malfunctions;
- recognition of and action to be taken in the event of failure of ground equipment
- importance and significance of alert height, if applicable, and the action in the event of any failure above and below the alert height
- importance of correct seating and eye position
- the effect of known unserviceability and use of MELs

[ Airbus Amber ]

# The Flight Crew Qualification & Training

**FSTD training and/or flight training Program is defined in**

**AMC2 SPA.LVO.120(b) Flight crew competence**

simplified extract:

**Normal operations (Phase one)**

Initial CAT II and III training:

- approach with AP/FG including **transition to visual flight and landing**
- approach with all engines operating and AP/FG **followed by missed approach**
- where appropriate, approach with Autoland

Note: extract of requirements based on LVO using Autoland functions. Other requirements for EFVS, HUD.



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# The Flight Crew Qualification & Training


## Abnormal operations (Phase two)

- **Engine Fire**
- **Critical equipment system failures** (electrical, AFS, approach aids)
- **AFS failures reversion to manual handling**
  - at or above DH
  - below DH
- **System failures** with excessive LOC and/or G/S deviation, above and below DH, in the minimum visual conditions specified for the operation.
- **Incapacitation procedures** appropriate to LVTO, CAT II and CAT III operations
- Failures specific to A/C type

Note: extract of requirements based on LVO using Autoland functions. Other requirements for EFVS, HUD.

# The Flight Crew Qualification & Training


**minimum number of FSTD sessions**

**Initial training**
⇒ **6 approaches** minimum

**Checking**
⇒ **1 approaches** followed by **Go-Around**
⇒ **1 automatic approach**

Note: extract of requirements based on LVO using Autoland functions. Other requirements for EFVS, HUD.

# The Flight Crew Qualification & Training

[ Airbus Amber ]

## Line Flying Under Supervision (LIFUS)

**AMC2 SPA.LVO.120(b) Flight crew competence**

For **CAT II manual landing ⇒ 3 landings** from AP disconnect

Only **one manual landing** is required when training on an FSTD qualified for **zero flight time conversion**

For **CAT III ⇒ 2 autolands minimum**

Only **1** autoland is required when training on an FSTD qualified for **zero flight time conversion**

**no** auto-land is required during LIFUS when training on an FSTD qualified for **zero flight time conversion** and the flight crew member successfully completed the **ZFT type rating conversion course**.



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# The Flight Crew Qualification & Training

[ Airbus Amber ]

## TYPE AND COMMAND EXPERIENCE

**GM1 SPA.LVO.120(a) Flight crew competence**

This chapter indicates requirement for CAT II and CAT III regarding command experience:

- the minimum flight hours or sectors
- the height to be add to RVR before reaching a certain nb of flight hours or sectors



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# The Flight Crew Qualification & Training

## RECURRENT TRAINING AND CHECKING - LVO

**AMC4 SPA.LVO.120(b) Flight crew competence**

It includes the minimum exercises to perform during the recurrent and checking FSTD sessions.

[ Airbus Amber ]



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# The Flight Crew Qualification & Training

## Training Credits – abbreviated courses

Flight crew **without CAT II/III experience**
⇒ **full training**

Flight crew **with CAT II/III experience** with a similar type of operation, with **another EU operator**
⇒ **abbreviated ground training course** if operating a different type or class
⇒ **abbreviated ground and FSTD training course** if operating the same type or class

Flight crew **with CAT II or CAT III experience** with **the operator**
**=> abbreviated ground and FSTD training course** when changing aircraft type or class

# The Flight Crew Qualification & Training

## Why is it possible to have Training Credits?

- **the level of technology**
  FGS and associated displays and controls
  FMS and its integration or not with the FGS

- **operating procedures**
  fail-passive / fail-operational, alert height
  manual landing / automatic landing
  no DH operations

- **handling characteristics**
  manual landing from automatic guided approach
  manual missed approach procedure from automatic approach
  automatic/manual rollout

# The Flight Crew Qualification & Training

**Operational Suitability Data (OSD)**

**Reglementary Basis for training (CS-FCD)**

**Authored by OEM**

**Endorsed by EASA**

**Indicate differences between A/C type / variant / system function**
**indicate training credits between A/C type / variant / system function**

⇒ For minimum training
⇒ for checking
⇒ for currency




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# The Flight Crew Qualification & Training

## Training credits: Operational Suitability Data (OSD)

### 7.4 Training for Low Visibility Operations

**[M]** With reference to SPA.GEN.105(b)(2) and SPA.GEN.120, and in accordance with AMC1 SPA.LVO.120, for pilots qualified and current in A330/A350, A340 or A380 low visibility operations when transitioning to the A320, a minimum of one low visibility approach and landing should be included in CCQ course.

**[AMC]** With reference to AMC1 SPA.LVO.105 and AMC6 SPA.LVO.105, all A320 family variants are the same type/variant of aircraft for LVO qualification, provided CATII/CATIII operations are approved for the model as per the applicable Flight Manual.

# The Flight Crew Qualification & Training

## EASA license endorsement

| XII Ratings, certificates and privileges | | | | |
|---|---|---|---|---|
| **Class/Type** | **Valid until** | **IR Cat.** | **Valid until** | **Remarks and Restrictions** |
| A320 | 28/02/2022 | CAT II/III | 28/02/2022 | TRI, MP |
| A330/350 | 31/07/2021 | CAT II/III | 31/07/2021 | TRI, MP |
| **Instructors** | **Valid until** | | | **Remarks and Restrictions** |
| TRI(MPA) | 28/02/2022 | | | |
| **Examiners** | **Valid until** | | | **Remarks and Restrictions** |
| TRE(A) | 31/07/2022 | | | |

| XII | Ratings, certificates and privileges |
|---|---|
| **Class/Type/IR** | **Remarks and Restrictions** |
| Instrument | Nil |
| A320 | LV |
| Night | Nil |
| | **No Further Entries** |
| **Instructors** | **Remarks and Restrictions** |
| TRI A320 | FFS/And LIFUS instructor |
| | **No Further Entries** |
| **Examiners** | |
| See Certificate Number GBR.4050840 | |
| **No Further Entries** | |

XII - CERTIFICATE OF REVALIDATION

| Rating Certificate Endorsement | Date of Rating Test | Date of IR Test | Valid Until | Examiner's Certificate Number | Examiner's Signature |
|---|---|---|---|---|---|
| TRI A320 | 15/11/2012 | N/A | 29/02/2016 | CAA0018 Civil Aviation Authority | |
| A320/IR/LV | 25/02/2014 | 25/02/2014 | 28/02/2015 | CAA0018 Civil Aviation Authority | |



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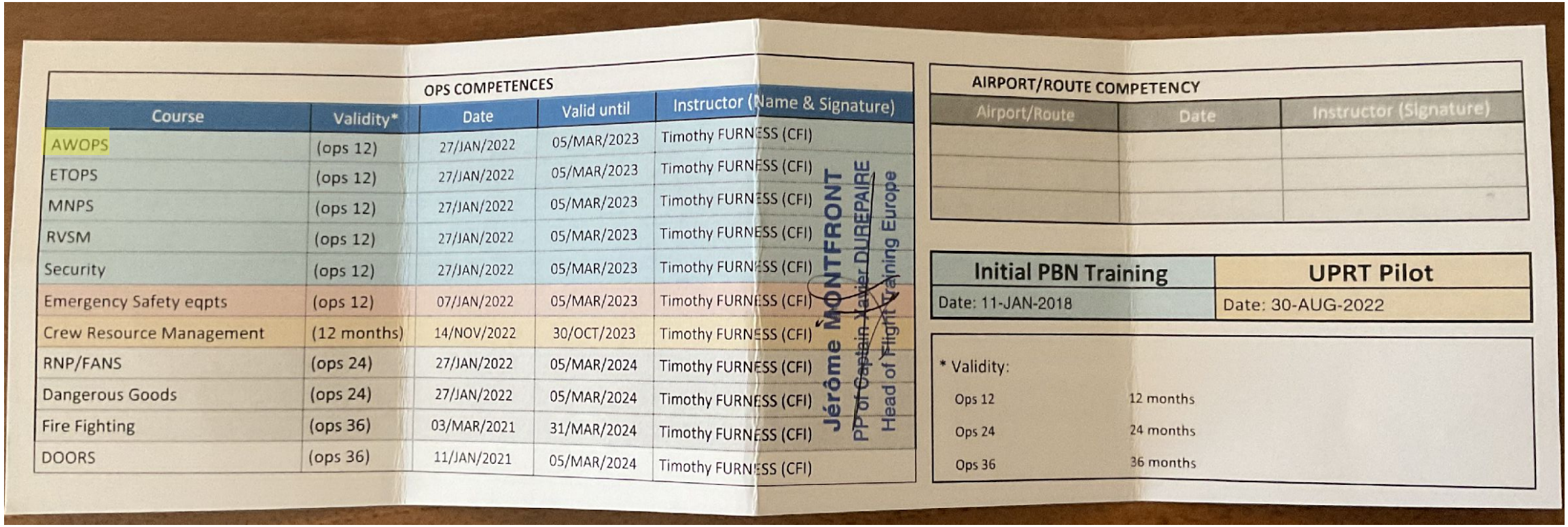
# The Flight Crew Qualification & Training

## Crew Card



OPS COMPETENCES

| Course | Validity* | Date | Valid until | Instructor (Name & Signature) |
|---|---|---|---|---|
| AWOPS | (ops 12) | 27/JAN/2022 | 05/MAR/2023 | Timothy FURNESS (CFI) |
| ETOPS | (ops 12) | 27/JAN/2022 | 05/MAR/2023 | Timothy FURNESS (CFI) |
| MNPS | (ops 12) | 27/JAN/2022 | 05/MAR/2023 | Timothy FURNESS (CFI) |
| RVSM | (ops 12) | 27/JAN/2022 | 05/MAR/2023 | Timothy FURNESS (CFI) |
| Security | (ops 12) | 27/JAN/2022 | 05/MAR/2023 | Timothy FURNESS (CFI) |
| Emergency Safety eqpts | (ops 12) | 07/JAN/2022 | 05/MAR/2023 | Timothy FURNESS (CFI) |
| Crew Resource Management | (12 months) | 14/NOV/2022 | 30/OCT/2023 | Timothy FURNESS (CFI) |
| RNP/FANS | (ops 24) | 27/JAN/2022 | 05/MAR/2024 | Timothy FURNESS (CFI) |
| Dangerous Goods | (ops 24) | 27/JAN/2022 | 05/MAR/2024 | Timothy FURNESS (CFI) |
| Fire Fighting | (ops 36) | 03/MAR/2021 | 31/MAR/2024 | Timothy FURNESS (CFI) |
| DOORS | (ops 36) | 11/JAN/2021 | 05/MAR/2024 | Timothy FURNESS (CFI) |

Jérôme MONTFRONT
PP of Captain Xavier DUREPAIRE
Head of Flight Training Europe

AIRPORT/ROUTE COMPETENCY

| Airport/Route | Date | Instructor (Signature) |
|---|---|---|
| | | |
| | | |
| | | |

| Initial PBN Training | UPRT Pilot |
|---|---|
| Date: 11-JAN-2018 | Date: 30-AUG-2022 |

* Validity:

| | |
|---|---|
| Ops 12 | 12 months |
| Ops 24 | 24 months |
| Ops 36 | 36 months |

# #6 Operator qualification

**Concept** **Regulations** **Airport** **Aircraft** **Flight crew** **Operator**



AIRBUS

# LVO – Operator qualification

## LVO capability

**Airport Facilities**

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**A/C Capability**

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**Crew's capability**

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**Operator's qualification**



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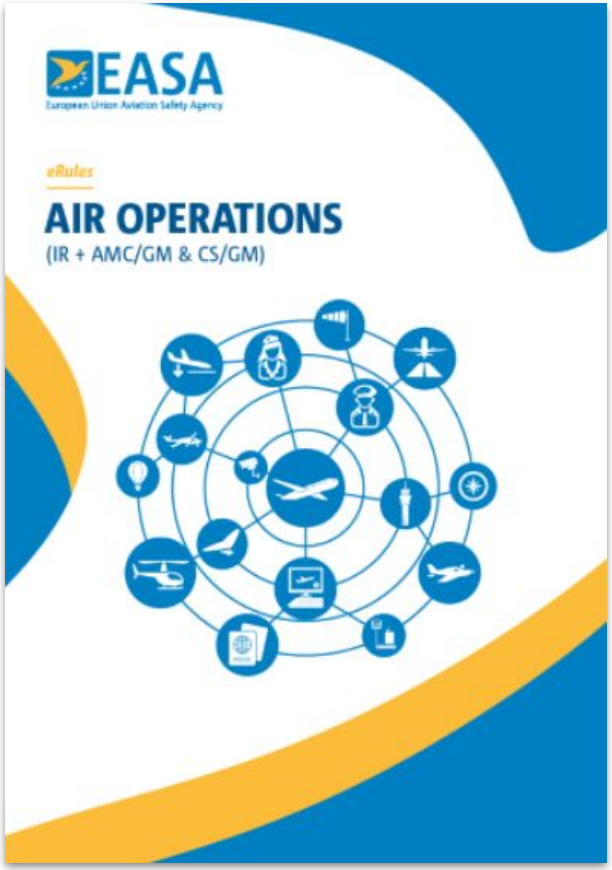
# LVO – Operator qualification




**SUBPART E : LOW-VISIBILITY OPERATIONS (LVOS) AND OPERATIONS WITH OPERATIONAL CREDITS**

**SPA.LVO.100 Low-visibility operations and operations with operational credits**

**SPA.LVO.105 Specific approval criteria**

**SPA.LVO.110 Aerodrome-related requirements, including flight procedures**



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# LVVO: Operator qualification

## Specific Approval Criteria

### SPA.LVO.105 Specific approval criteria

*Regulation (EU) 2021/2237*

To obtain a specific approval as required by SPA.LVO.100, the operator shall demonstrate that:

(a) for low-visibility approach operations, LVTO operations in an RVR less than 125 m, and operations with operational credits, the aircraft has been certified for the intended operations;

(b) the flight crew members are competent to conduct the intended operation and a training and checking programme for the flight crew members and relevant personnel involved in the flight preparation has been established, in accordance with SPA.LVO.120;

(c) operating procedures for the intended operations have been established;

(d) any relevant changes to the minimum equipment list (MEL) have been made;

(e) any relevant changes to the maintenance programme have been made;

(f) procedures have been established to ensure the suitability of aerodromes, including instrument flight procedures, for the intended operations, in accordance with SPA.LVO.110; and

(g) for the intended operations, a safety assessment has been carried out, and performance indicators have been established to monitor the level of safety.

# LVO: Operator qualification

## Specific Approval Criteria

- A/C certification
- Flight Crew Qualification
- Operating Procedures
- MEL
- Maintenance Program
- Suitability of Aerodrome
- Safety Assessment

→ **OPERATIONAL APPROVAL DOSSIER SUBMITTED TO NAA**

# LVVO: Operator qualification

## Specific Approval Criteria

- A/C certification
- Flight Crew Qualification
- Operating Procedures
- MEL
- Maintenance Program
- Suitability of Aerodrome
- Safety Assessment

AFM A/W compliance statement // Limitations

# LVVO: Operator qualification

## Specific Approval Criteria

- A/C certification
- Flight Crew Qualification
- Operating Procedures
- MEL
- Maintenance Program
- Suitability of Aerodrome
- Safety Assessment
- AFM A/W compliance statement // Limitations
- Training

# LVVO: Operator qualification

## Specific Approval Criteria

- A/C certification
- Flight Crew Qualification
- Operating Procedures
- MEL
- Maintenance Program
- Suitability of Aerodrome
- Safety Assessment
- AFM A/W compliance statement // Limitations
- Training
- SOPs

# LVO – Operator qualification

**Operating procedure**

- **Operators specify their LVO procedures**

OM (A/B/C/D) and Aircraft Manuals has been revised to include procedures appropriate for CAT II and CAT III operations.

(Extracts of FCOM and Operation Manual include LVO)

Compatible with limitations and mandatory procedures of AFM

Specific minima in Air Operators Certificate (AOC)

# LVVO: Operator qualification

## Specific Approval Criteria

- A/C certification
- Flight Crew Qualification
- Operating Procedures
- MEL
- Maintenance Program
- Suitability of Aerodrome
- Safety Assessment

- AFM A/W compliance statement // Limitations
- Training
- OM update based on FCOM
- MEL update based on MMEL

# LVVO: Operator qualification

## Specific Approval Criteria

| | |
|---|---|
| A/C certification | AFM A/W compliance statement // Limitations |
| Flight Crew Qualification | Training |
| Operating Procedures | OM update based on FCOM |
| MEL | MEL update based on MMEL |
| Maintenance Program | Covered by equipment maintenance program |
| Suitability of Aerodrome | |
| Safety Assessment | |

# LVO – Operator qualification

## Maintenance Program

- **Maintenance Aspect**

**All Airbus aircraft ⇒ CAT II / CAT III part of basic design standard of the aircraft.**

Maintenance tasks covered by respective maintenance program (by ATA chapter) without special recommendations for scheduled maintenance tasks.

However, operators should comply with supplemental national requirements when applicable.

ATA : Air Transport Association

# LVO – Operator qualification

## Maintenance Program

**Airbus aircraft do not require scheduled periodic use, confidence tests or functional checks to assure CAT II / CAT III certification.**



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# LVVO: Operator qualification

## Specific Approval Criteria

| | |
|---|---|
| A/C certification | AFM A/W compliance statement // Limitations |
| Flight Crew Qualification | Training |
| Operating Procedures | OM update based on FCOM |
| MEL | MEL update based on MMEL |
| Maintenance Program | Covered by equipment maintenance program |
| Suitability of Aerodrome | New rules in AIR OPS |
| Safety Assessment | |

# Focus on Part SPA LVO 110: Airport Suitability Assessment for LVO

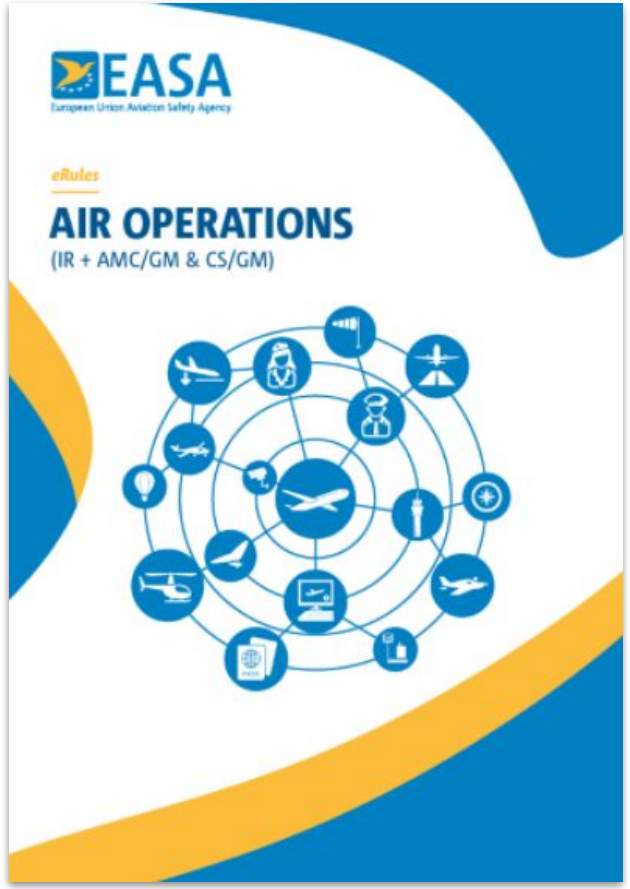
**AMC1 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures**

There are 3 possible ways to perform the assessment of the suitability of airports

**#1** **Previous Operational Data**

**#2** **Desktop Assessment**

**#3** **Operational Demonstration**



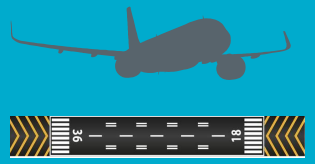



AIRBUS

# Airport Suitability Assessment for LVO


**Already approved for LVO on:**

**1 A/C type**
**1 runway**



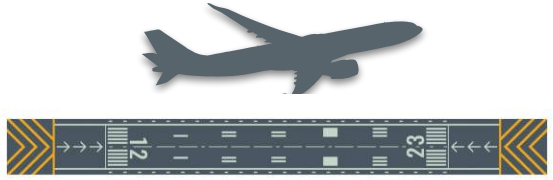

Grandfather Law


**Still approved**

**(provided you have data (FDA))**

**Assessment needed in the case of:**

- Introduction of new A/C type
- Introduction of a new runway




# #1 Previous Operational Data



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# Airport Suitability Assessment for LVO

**Airbus cannot provide "Previous Operational Data" from other operators**

**Possibility to share in the same group**

**Platform to share operational data for members**

## #1 Previous Operational Data

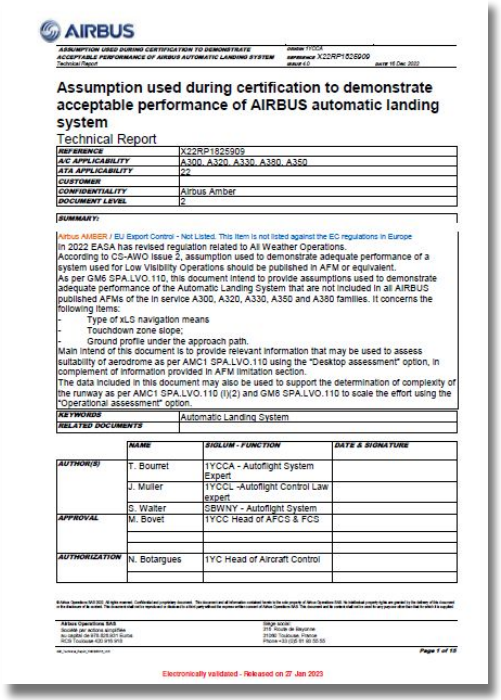
# Airport Suitability Assessment for LVO

## Under Operator Responsibility

- Airbus provides technical note ref X22RP1825909
- Assumption for the demonstration of autoland
  - **Type of xLS navigation means**
  - **Touchdown zone slope**
  - **Ground profile under the approach path**

Available on AirbusWorld

*Note: Applicable for All Airbus A/C except A220*
*Introduction of A220 in coming months*



AIRBUS

**Assumption used during certification to demonstrate acceptable performance of AIRBUS automatic landing system**

Technical Report

| | |
|---|---|
| REFERENCE | X22RP1825909 |
| A/C APPLICABILITY | A300, A320, A330, A380, A350 |
| ATA APPLICABILITY | 22 |
| CUSTOMER | |
| CONFIDENTIALITY | Airbus Amber |
| DOCUMENT LEVEL | 2 |

SUMMARY:

Airbus AMBER / EU Export Control - Not Listed. This item is not listed against the EC regulations in Europe

In 2022 EASA has revised regulation related to All Weather Operations.
According to CS-AWO Issue 2, assumption used to demonstrate adequate performance of a system used for Low Visibility Operations should be published in AFM or equivalent.
As per GM6 SPA.LVO.110, this document intend to provide assumptions used to demonstrate adequate performance of the Automatic Landing System that are not included in all AIRBUS published AFMs of the in service A300, A320, A330, A350 and A380 families. It concerns the following items:

- Type of xLS navigation means
- Touchdown zone slope;
- Ground profile under the approach path.

Main intend of this document is to provide relevant information that may be used to assess suitability of aerodrome as per AMC1 SPA.LVO.110 using the "Desktop assessment" option, in complement of information provided in AFM limitation section.
The data included in this document may also be used to support the determination of complexity of the runway as per AMC1 SPA.LVO.110 (l)(2) and GM6 SPA.LVO.110 to scale the effort using the "Operational assessment" option.

| | |
|---|---|
| KEYWORDS | Automatic Landing System |
| RELATED DOCUMENTS | |

| | NAME | SIGLUM - FUNCTION | DATE & SIGNATURE |
|---|---|---|---|
| AUTHOR(S) | T. Bourret | 1YCCA - Autoflight System Expert | |
| | J. Muller | 1YCCL -Autoflight Control Law expert | |
| | G. Walter | SBWNY - Autoflight System | |
| APPROVAL | M. Bovet | 1YCC Head of AFCS & FCS | |
| | | | |
| | | | |
| AUTHORIZATION | N. Botargues | 1YC Head of Aircraft Control | |
| | | | |

Electronically validated - Released on 27 Jan 2023

# #2 Desktop Assessment

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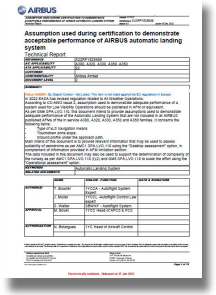
# Airport Suitability Assessment for LVO

**Airbus Certification Hypothesis**




**AIP Published Runway Profiles**

- Only a small number of LVO approaches are not compliant, but verification still to be performed by the Operator
- **If the OEM assumptions are not fulfilled** ⇒ This is not forbidden. Additional analysis required




AIRBUS

# Airport Suitability Assessment for LVO

"Classical way" up to now


Operational approval granted by authority to Operator step by step

for "very complex cases" → Contact Airbus



## #3 Operational Demonstration

GM6.SPA.LVO.110

AIRBUS

# Airport Suitability Assessment for LVO

- Framework for Operators
- Basis for Other NAA
- Basis for Airbus as European OEM

And Outside Europe?



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# LVO: Operator qualification

## Specific Approval Criteria

| | |
|---|---|
| A/C certification | AFM A/W compliance statement // Limitations |
| Flight Crew Qualification | Training |
| Operating Procedures | OM update based on FCOM |
| MEL | MEL update based on MMEL |
| Maintenance Program | Covered by equipment maintenance program |
| Suitability of Aerodrome | New rules in AIR OPS |
| Safety Assessment | operational demonstration |

# LVO – Operator qualification

**Safety assessment**

- An operator **must prove** that he can perform CAT II or CAT III operations with the **appropriate success rate and level of safety**.

  Operator carry out a proving program called "operational demonstration" or "in-service proving" to demonstrate in line service, the performance and the reliability of the aircraft and its systems meet the airworthiness certification criteria

- The authority considers flight **reports or recordings** and the resulting approach/landing success rate.

# LVO – Operator qualification

## Safety assessment

- **Continuous monitoring**

**Data and statistics to monitor** the automatic approach and landing success rate will be established.

PIREPs of any unsatisfactory approach and automatic landing or aircraft system malfunction **will be retained for a period of twelve months**. All the data will be available to the authorities



PIREP: PIlot REPort

# LVO: Operator qualification

## Specific Approval Criteria

- A/C certification
- Flight Crew Qualification
- Operating Procedures
- MEL
- Maintenance Program
- Suitability of Aerodrome
- Safety Assessment

## OPERATIONAL APPROVAL DOSSIER SUBMITTED TO NAA

- AFM A/W compliance statement // Limitations
- Training
- OM update based on FCOM
- MEL update based on MMEL
- Covered by equipment maintenance program
- New rules in AIR OPS
- operational demonstration

# LVO – Operator qualification


- **Step by Step operational approval:**

  CAT I => CAT II => CAT III => CAT III No DH

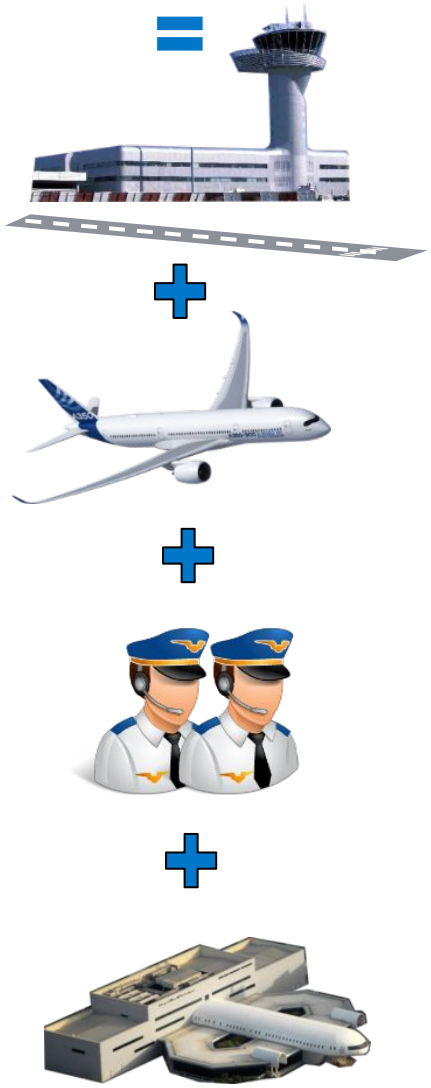
# # Conclusion

# CONCLUSION

[ Airbus Amber ]

- **Level of safety in LVO equivalent to normal operations**

- **Low Visibility Operations based on:**
  - **Airport** facilities
  - **Aircraft** capability
  - **Flight crew** qualification based on initial and recurrent training
  - **Operators** procedures and qualification



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Thank you

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