



## Civil Aviation Advisory Publication

July 2011

This publication is only advisory but it gives a CASA preferred method for complying with the *Civil Aviation Regulations 1988*.

It is not the only method, but experience has shown that if you follow this method you will comply with the Civil Aviation Regulations.

Read this advice in conjunction with the appropriate regulations.

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## The relevant regulations and other references

- [Civil Aviation Order 20.7.1B](#)
- ICAO Annex 10, Volume I: Radio Navigation Aids
- ICAO Annex 14 Volume I: Aerodrome Design and Operations
- ICAO Manual of All Weather Operations Doc 9365-AN/910
- Regulation 257 of the Civil Aviation Regulations 1988 ([CAR 1988](#))

## Who this CAAP applies to

- Australian aircraft operators wishing to conduct low visibility operations both within Australia and overseas; and
- Foreign aircraft operators wishing to conduct low visibility operations within Australia.

## Why this publication was written

The Civil Aviation Advisory Publication (CAAP) provides Australian and foreign aircraft operators with information on preparing an application for an exemption from standard operating minima in order to conduct low visibility landings or low visibility take-offs operations.

## Status of this CAAP

This is the first issue of CAAP LVO-1(0).

## For further information

Contact the relevant Civil Aviation Safety Authority ([CASA](#)) Regional Office for your operation on 131 757.

## 1. Acronyms

<b>AIP</b>	Aeronautical Information Publication
<b>AFM</b>	aircraft flight manual
<b>AMM</b>	aircraft maintenance manual
<b>AOM</b>	aircraft operations manual
<b>ATC</b>	air traffic control
<b>CAAP</b>	Civil Aviation Advisory Publication
<b>CAR</b>	Civil Aviation Regulations (1988)
<b>CASA</b>	Civil Aviation Safety Authority
<b>CAT</b>	Category
<b>DDG</b>	dispatch deviations guide
<b>DH</b>	decision height
<b>END</b>	end zone
<b>EVS</b>	enhanced vision system
<b>ft</b>	feet
<b>HUD</b>	Head Up Display
<b>ILS</b>	Instrument Landing System
<b>IFR</b>	instrument flight rules
<b>ICUS</b>	in command under supervision
<b>kt</b>	knot
<b>LDA</b>	landing distance available
<b>LH</b>	left hand
<b>LSALT</b>	lowest safe altitude
<b>LVO</b>	low visibility operation
<b>LVP</b>	low visibility procedure(s)
<b>m</b>	metre
<b>MEL</b>	Minimum Equipment List
<b>MID</b>	mid zone
<b>MSA</b>	minimum sector altitude
<b>PF</b>	pilot flying
<b>PIC</b>	pilot-in-command
<b>RH</b>	right hand
<b>RV</b>	runway visibility
<b>RVR</b>	runway visual range
<b>TDZ</b>	touchdown zone

## 2. Definitions

**Fail-passive flight control system.** A flight control system is fail-passive if, in the event of a failure, there is no significant out-of-trim condition or deviation of flight path or attitude but the landing is not completed automatically. For a fail-passive automatic flight control system the pilot assumes control of the aeroplane after a failure.

**Fail-operational flight control system.** A flight control system is fail-operational if, in the event of a failure below alert height, the approach, flare and landing, can be completed automatically. In the event of a failure, the automatic landing system will operate as a fail-passive system.

**Low visibility operations (LVO).** An operation involving:

- an approach with minima less than precision approach category I; or
- a take-off with visibility below 550 m.

**Low visibility take-off.** A take-off with visibility below 550 m.

**Low visibility procedures.** Procedures applied at an aerodrome for protecting aircraft operations during conditions of reduced visibility or low cloud.

**Runway visual range (RVR).** The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

*Note: Within Australia, the term **runway visual range (RVR)** is used exclusively in relation to RVR measured by an instrumented system.*

**Runway visibility (RV).** The distance along a runway over which a person can see and recognise a visibility marker or runway lights.

*Note: The term **runway visibility** is used by air traffic control (ATC) or ground personnel to report visibility along a runway as determined by a ground observer.*

## 3. Introduction

### 3.1 Why the publication was written

3.1.1 Instrument approach and Instrument Flight Rules (IFR) take-off minima are established in Australia as a legislative determination made under Regulation 257 of [CAR](#) 1988. These minima are intended for broad use by pilots and aircraft operators without the need for specific permission from CASA. Consequently the minima promulgated by determination are given as:

- values not less than those which apply for a Category I precision approach; or
- take-off minima with visibility not less than 550 m.

3.1.2 These minima are consistent with international practice that requires operators to have specific approval to conduct instrument approaches with minima less than Category (CAT) I and to conduct low visibility take-offs.

3.1.3 For operators wishing to conduct operations with lower minima, CASA is able to grant operators an exemption to the 'standard' minima determined under Regulation 257 of CAR 1988. This exemption will require the approved operator to comply with specify requirements.

3.1.4 This CAAP is written to provide potential applicants for an exemption to the standard minima with information on:

- the specific range of minima that CASA will normally grant under an exemption; and
- the specific conditions CASA will normally apply to the exemption.

The information is intended to assist operators with any application for exemption against the standard minima requirements.

## **3.2 The Rules**

3.2.1 Regulation 257 of CAR 1988 authorises CASA to determine the meteorological minima for the landing or taking off of an aircraft at an aerodrome.

3.2.3 CASA issues a Determination from time to time, which sets out the various minima. These minima are then reflected in the Aeronautical Information Publication (AIP).

## **4. Method of approval**

### **4.1 Operations within Australia**

4.1.1 Authorisation to Australian and foreign aircraft operators to conduct low visibility operations (LVO) within Australia will be given to by way of an Instrument of Exemption to the above determination.

### **4.2 Operations outside Australia**

4.2.1 Australian operators intending to conduct LVO in another country will need:

- An exemption from CASA to conduct the relevant LVO;
- An approval from the foreign regulatory authority to conduct the relevant LVO; and
- To provide the following information to CASA:
  - For landing operations, a statement confirming the aerodrome and runway terrain details and charts, including the calculations used to determine the applicable minima have been checked; and
  - A copy of the foreign approval for LVO.

## **5. How to apply**

### **5.1 Applications from foreign aircraft operators**

5.1.1 Foreign aircraft operators should apply to:

International Operations  
Civil Aviation Safety Authority  
PO Box 2005  
CANBERRA ACT 2601, AUSTRALIA

5.1.2 The request must include a copy of the operator's approval for LVOs from their own regulatory authority.

## 5.2 Applications from Australian aircraft operators

5.2.1 The operator should contact the relevant CASA office for your operation in the first instance to commence the process for requesting an exemption to conduct LVO.

5.2.2 CASA will arrange a suitable time for an interview. At the interview CASA will provide a cost estimate for the time it will require to assess the application.

5.2.3 The operator will need to provide CASA with all applicable documentation including:

- aircraft flight manual (AFM) approval for the application;
- information intended to be inserted into operations manuals covering crew training, crew low visibility procedures and flight administration procedures in tracking autoland results;
- applicable Minimum Equipment List (MEL) entries pertaining to necessary aircraft equipment;
- aircraft maintenance manual procedures for maintaining autoland to low visibility status; and
- procedures for the operator to determine the aircraft operating minima.

5.2.4 Operators may apply for 'restricted low visibility take-off minima to 350 m' or 'low visibility landing minima CAT II or CAT III' and/or 'unrestricted low visibility take-off minima'.

### *Prerequisites*

5.2.5 Approval will only be given to operators of two-pilot aircraft with access to the aircraft-type simulator (at least level C), with applicable low visibility runway modelling and lighting standards for taxiways, runways and approach. Pilots will be required to access the simulator for competency assessment (nominally) every six months.

5.2.6 Approval for autoland operations will normally be an essential prerequisite for grant of an exemption to conduct low visibility landings. However, CASA will consider requests for use of certified Enhanced Vision Systems (EVS) and Head Up Displays (HUD) in relation to CAT II for separate or single systems or CAT IIIA for combined or dual systems.

*Note:* See Appendix 2. for the requirements for an autoland approval

### *Levels of LVO exemption*

3.2.7 The operator can expect:

- a low visibility take-off minima exemption after an successful assessment of crew training in a simulator;
- if a new low visibility operator:
  - an initial autoland approval for CAT I minima; then
  - following a period of gaining autoland data and assessing the maintenance program and crew training, an exemption to conduct CAT II operations; then
  - following a successful completion of six months of continuing assessment of maintenance and crew operations, a further exemption for CAT III.

## 6. Range of operational minima

### 6.1 Low visibility take-offs

6.1.1 CASA will approve low visibility take-off exemptions around the minima and associated aerodrome facility requirements in the following table.

Minima	Required Aerodrome Facilities
350 m (Notes 1, 2, 3 and 4)	<ul style="list-style-type: none"> <li>• Illuminated runway edge lighting at spacing intervals not exceeding 60 metres.</li> <li>• Runway centreline markings.</li> <li>• Touchdown zone (TDZ) and Mid-point (MID) RVR information available.</li> </ul>
200 m (Notes 3 and 4)	<ul style="list-style-type: none"> <li>• Illuminated high intensity runway edge lighting at spacing intervals not exceeding 60 metres.</li> <li>• Illuminated runway centreline lighting at spacing intervals not exceeding 15 metres.</li> <li>• TDZ and MID RVR information available.</li> </ul>
125 m/150 m (Note 4 and 5)	<ul style="list-style-type: none"> <li>• Illuminated high intensity runway edge lighting at spacing intervals not exceeding 60 metres.</li> <li>• Illuminated runway centreline lighting at spacing intervals not exceeding 15 metres.</li> <li>• TDZ, MID and End zone (END) RVR information available.</li> </ul>
100 m (Note 4 and 6)	<ul style="list-style-type: none"> <li>• ATC is safeguarding the Instrument Landing System (ILS) localiser critical and sensitive areas during the take-off.</li> <li>• Illuminated high intensity runway edge lighting at spacing intervals not exceeding 60 metres.</li> <li>• Illuminated runway centreline lighting at spacing intervals not exceeding 15 metres.</li> <li>• TDZ, MID and END RVR information available.</li> </ul>

Note 1: The reported RVR/visibility value representative of the initial part of the take-off run may be replaced by pilot assessment.

Note 2: RV may be used in lieu of RVR.

Note 3: If a MID zone RVR is not available, an END zone RVR may be substituted.

Note 4: The required RVR value must be achieved at all of the required RVR reporting points

Note 5: The higher value applies to Category D aeroplanes.

Note 6: Applicable only to aircraft with a certified take-off lateral guidance system.

6.1.2 CASA will apply the following conditions on low visibility take-off exemptions:

- low visibility take-offs can only be carried out using multi-engined aircraft whose performance is such that, in the event of a critical power unit failure at any point during take-off, the aeroplane can either stop or continue the take-off and maintain terrain clearance until reaching either en route lowest safe altitude (LSALT) or the departure aerodrome minimum sector altitude (MSA);

- the pilot-in-command (PIC) must not commence take-off unless:
  - the weather conditions at the departure aerodrome are equal to or better than applicable minima for landing at that aerodrome; or
  - the aeroplane's performance and fuel availability is adequate to enable the aeroplane to proceed to a suitable aerodrome, having regard to terrain, obstacles and route distance limitations.

## 6.2 Precision approach — Category II operations

6.2.1 CASA will apply the following minima to exemptions permitting precision approach – CAT II approaches:

- Decision height (DH): lower than 200 ft, but not lower than 100 ft.
- An RVR of not less than:
  - 300 m for TDZ; and
  - 125 m for MID; or if MID is not available, for END.

(TDZ and the other controlling)

**Visual reference.** The PIC must not continue an approach below the CAT II decision height unless the following visual references have been attained and can be maintained:

- a segment of at least 3 consecutive longitudinally aligned lights, being the centreline of the approach lights, or touchdown zone lights, or runway centre line lights, or runway edge lights, or a combination of these; and
- a lateral element of lighting, being an approach lighting crossbar, or landing threshold or a barrette of touchdown zone lighting.

## 6.3 Precision approach — Category IIIA operations

6.3.1 CASA will apply the following minima to exemptions permitting precision approach – CAT IIIA approaches:

- DH: not lower than 50 ft; or
- An RVR of not less than:
  - 175 m for TDZ; and
  - 125 m for MID or if MID is not available, for END.

(TDZ and the other controlling)

**Note:** A **controlling RVR** means the reported value of an RVR reporting location (touchdown, mid-point and stop-end) used to determine whether operating minima are, or are not, met.

**Visual reference.** The PIC must not continue an approach below a CAT IIIA decision height unless a visual reference comprising a segment of at least 3 consecutive longitudinally aligned lights, being the:

- centreline of the approach lights;
- touchdown zone lights;
- runway centre line lights;
- runway edge lights; or

- a combination of these has been attained and can be maintained.

## 6.4 Precision approach — Category IIIB operations

6.4.1 CASA will apply the following minima to exemptions permitting precision approach – CAT IIIB approaches:

- DH of less than 50 ft or no DH; and
- An RVR of not less than 75 m for TDZ, MID and END (all controlling).

**Visual reference.** The PIC must not continue an approach below a CAT IIIB decision height (where one is specified or required) unless a visual reference containing at least one centreline light is attained and can be maintained.

## 7. ATC and Aerodrome Requirements

### 7.1 Air traffic control services

7.1.1 CASA will only allow LVO to be conducted at an aerodrome where:

- aerodrome control (ATC) services are in operation; and
- ATC has declared low visibility procedures in effect.

### 7.2 Aerodrome capability

7.2.1 CASA will only allow LVO to be conducted at an aerodrome:

- within Australia, that meets the appropriate regulatory standards for operations at the visibility minima specified for the particular LVO; or
- within a foreign country, where that aerodrome or runway is approved by the foreign regulatory authority for operations at the minima specified for the particular LVO.

**Note:** *Many aerodromes in Australia do not have aerodrome lighting or infrastructure that fully conforms to the regulatory standards for operations in visibility conditions of less than 550 metres. In particular, many aerodromes do not have stop bar lighting or taxiway lighting with spacing of 30 metres or less as normally required for operations under these visibility conditions.*

*While some aerodrome limitations will not preclude LVOs, they do require aircraft operators:*

- *to be aware of limitations in aerodrome lighting;*
- *to take appropriate account of any limitations of aerodrome lighting on the aircraft operator's low visibility flight operations at the particular aerodrome; and*
- *to be aware that limitations in aerodrome lighting and infrastructure can constrain movement rates and flight operations under conditions of reduced visibility.*

*Details of Australian aerodrome lighting and infrastructure capabilities can be found in the AIP.*

## 8. Conditions on exemptions

### 8.1 General

8.1.1 This part of the CAAP details the conditions that CASA will impose on exemptions granted to Australian operators to conduct LVO. These conditions are standardised for all low visibility operational exemptions insofar as possible, however CASA may need to vary these conditions for particular cases.

8.1.2 Foreign aircraft operators approved for LVO will generally not be subject to these conditions, but would be required to conform to any conditions imposed by their own regulator.

### 8.2 On board documentation

8.2.1 The aircraft operator must ensure that there is an operations manual on board each aircraft containing:

- all the necessary crew procedures required for safe LVO;
- details of the aircraft equipment required for an automatic landing in CAT II and CAT III weather minima;
- a copy of the operator's low visibility Exemption;
- a list of aerodromes and runways approved for CAT II and CAT III operations; and
- the minima for the approved aerodromes and runways in the above list.

### 8.3 Training

8.3.1 The operator, or an approved training organisation, must certify that each pilot of the aircraft has successfully completed an LVO training course including ground training and flight simulator training.

8.3.2 The LVO training course syllabus must be approved in writing by CASA and may not be amended without CASA's written approval.

*Note: A CAT IIIB sample training course syllabus can be found in Appendix 1. Training courses for higher minima or for take-off only are reduced as applicable.*

### 8.4 Pilot experience

8.4.1 A pilot is authorised for LVO on the aircraft only if he or she has successfully:

- completed the aircraft-type LVO training in accordance with the approved training syllabus; and
- performed two autolands in the aircraft in at least CAT I conditions, 1 of which must be performed during line training if aircraft transition training is occurring.

8.4.2 Unless CASA approves otherwise in writing for an aircraft type with an approved cross-crew qualification transition course, the following pilot experience is required to operate to the lowest approved minima:

- for a captain:
  - at least 300 hours on any aircraft type as a PIC while authorised for CAT II or CAT III operations; and
  - at least 100 hours as PIC or in command under supervision or dual in the left hand (LH) seat on the aircraft type with the current operator.

- for a co-pilot:
  - at least 100 hours on any aircraft type as a co-pilot while authorised for CAT II or CAT III operations; and
  - at least 50 hours on the aircraft type with the current operator.

8.4.3 However, if a pilot does not have the experience mentioned above, he or she is restricted to:

- for take-off — a cross-wind not exceeding 10 kt and a minima of at least 200 m RVR; and
- for landing — CAT II minima of 100 ft DH and 450 m RVR in the TDZ.

## 8.5 Recency

8.5.1 A captain must have completed an autoland using LVO procedures in a flight simulator or in the aircraft type within the 90 days before conducting a CAT II or CAT III landing.

8.5.2 A captain must not conduct a CAT II or CAT III landing if he or she has lost recency and not regained it in way specified below.

8.5.3 A captain regains recency by performing an autoland:

- in a flight simulator; or
- in an aircraft in at least CAT I conditions.

## 8.6 Competency

8.6.1 Each pilot of the aircraft occupying a flight control seat during low visibility operations must have successfully completed in their respective roles, to the operator's approved operational and meteorological limits, a flight simulator competency check that includes:

- a take-off with a near V1 engine failure (reject) and a V1 engine failure (continue); and
- a CAT II or CAT III go-around; and
- a CAT II or CAT III landing.

8.6.2 Unless otherwise approved in writing by CASA, each pilot must demonstrate competency in LVO at least twice in every 12 months but not more than eight months and not less than four months may elapse between demonstrations.

8.6.3 Each pilot of the aircraft must demonstrate competency to an operational check captain of the aircraft type, at least once every 12 months.

8.6.4 A captain may not operate in LVO from the right hand (RH) seat unless he or she has demonstrated competency in LVO from the RH seat within the previous 12 months.

## 8.7 Operational restrictions

### *Take-offs and landings*

8.7.1 For take-off and landing, the following restrictions apply:

- for minima — the PIC of the aircraft must use the most restrictive of the following:
  - the minima approved in the aircraft flight manual (as amended);
  - the minima approved by CASA that apply to the type of operation or procedure in which the aircraft is engaged;

- the minima shown on the operator's aerodrome chart used for take-off or approach and landing; and
- the minima approved by the relevant foreign aviation regulatory authority;
- the maximum cross-wind component for an aircraft conducting an LVO is:
  - if any RVR is less than 200 m — 10 kt; or
  - otherwise — 15 kt;
- the pilot flying must:
  - be a captain with the operator; and
  - not be undergoing initial command training with the operator; and
  - occupy the LH seat;
- an abbreviated check list must include all relevant information for:
  - briefing on low visibility take-offs and landings; and
  - identifying the aircraft equipment necessary for carrying out the LVO;
- the approach, runway, taxiway and ramp lighting must be operating in accordance with the aerodrome lighting requirements for the type of operation.

### ***Take-offs***

8.7.2 For take-offs, the operator's procedures must include a standard call for the pilot monitoring to advise the pilot flying of deviations from the runway centreline.

8.7.3 At start up, the flight crew must inform ATC if there is a requirement to conduct a take-off that requires protected guidance provided by an ILS localiser.

### ***Landings***

8.7.4 For landings, the following approach ban rules apply:

- when making an approach, the PIC of the aircraft must not continue beyond 1 000 ft above aerodrome elevation if a controlling zone RVR is reported by ATC as continually less than the specified minimum for the approach; and
- if, after passing 1 000 ft above aerodrome elevation, a controlling zone RVR is reported by ATC as falling below the specified minimum, the approach may be continued to the minima.

8.7.5 The runway must have been assessed by the operator as suitable for autoland in accordance with the operator's 'Safety Operational Specification – Approval to Conduct Autolands'.

8.7.6 For landings, the braking action on the runway must not be reported by ATC as worse than 'medium'.

8.7.7 The landing distance available for the aircraft must be the greater of:

- 2 200 m; or
- 1.15 times the landing distance required under subsection 11 of CAO 20.7.1B.

8.7.8 For a CAT II landing, until visual conditions are established, the aircraft must have at least a fail-passive automatic landing system.

8.7.9 For a CAT IIIA landing, the aircraft must have at least a fail-passive automatic landing system and an automatic go-around capability.

8.7.10 For a CAT IIIB landing, the aircraft must have a fail-operational landing system with roll-out control guidance and an automatic go-around capability.

## **8.8 Maintenance**

8.8.1 The aircraft equipment required for low visibility operation must be maintained in accordance with the Aircraft Maintenance Planning Document.

**APPENDIX 1 TO CAAP LVO -1(0) –****SUGGESTED TRAINING SYLLABUS FOR ILS CATEGORY IIIB APPROACHES AND TAKEOFFS WITH A VISIBILITY OF 125 METRES**

This appendix provides a suggested syllabus for operation training for ILS Category IIIB approaches and take-offs with a visibility of 125 metres. The syllabus for operations with higher landing or take-off minima does not need to be as comprehensive.

**Part A – Ground training**

Ground training must cover at least the following subjects:

- general concepts and appropriate definitions (see ICAO *Manual of All Weather Operations* Doc 9365-AN/910);
- the importance of Alert Height, and actions in the event of failures above and below the Alert Height; a knowledge of aircraft or ground equipment failures not protected by the Alert Height concept;
- aerodrome visual aids, markings and lighting systems;
- use and limitations of different types of RVR systems;
- ILS characteristics, limitations and Class of Performance classification (see ICAO Annex 10 Volume I, Attachment C);
- the principles of obstacle clearance requirements; factors affecting the determination of minima;
- effect of terrain profiles on radio altimeter readings at DH and on the autoland system;
- characteristics of fog – homogenous and non-homogenous;
- effects of cold temperature on the barometric altimeter's reading for the glide slope check;
- effects of precipitation, ice accretion, low level windshear and turbulence;
- actions to be taken in the event of airborne or ground equipment failures;
- reversionary minima;
- an understanding of any special aircraft maintenance requirements for LVO equipment; and
- correct seating and eye position.

**Part B – Flight simulator training**

The session should be approximately three hours for a captain paired with a first officer or four hours for two paired captains. The session should be a stand-alone exercise conducted after all endorsement training has been completed. The simulator must be at least level C and type specific with correct visual modelling.

Some exercises should be conducted at maximum take-off weight (to provide a maximum split between V1 and VR) and maximum landing weight, both take-off and landing at approved (or applied for) RVR minima with up to maximum cross-wind and where possible a mix of day and night environment.

Training must include:

- normal operation with no failures;
- visual cues required for landings;
- checks of satisfactory functioning of ground and aircraft equipment;
- correct use of MEL and the effect of known unserviceabilities;
- effects on minima caused by changes in the status of ground installations;

- correct monitoring of automatic flight control systems and annunciators;
- any reduced operating limitations;
- maximum deviation allowed for glide slope and localizer;
- actions to be taken in the event of failures or malfunctions of:
  - ILS transmitter, ILS receiver(s);
  - radio altimeter(s);
  - autopilot(s) and autothrust system;
  - primary and standby attitude failure;
  - engine, electrical, hydraulic, flight control and instrumentation systems;
  - autoland system indicated by lack of expected FMA annunciations (flare, rollout);
- system failures pertinent to the aircraft type which would prevent an autoland when a failure occurs below the Alert Height;
- engine-out autoland and engine-out missed approach;
- loss of visibility during take-off and below the minima during approach;
- pilot incapacitation during take-off and approach; and
- fail-passive automatic landing approach with further system failure below the minima.

### **Taxi exercise**

Use of the aerodrome chart in following cleared taxi route to and from the runway and the terminal, identifying stop bars and CAT II or CAT III holding points and using all options to check line up on the correct runway.

### **Take-off exercises**

There must be a minimum of eight take-offs resulting in becoming airborne or in a rejected take off (RTO), covering the exercises below. Additional exercises should be conducted to cover operator requirements and the above training requirements.

If the use of HUD is required to gain lower take-off visibility minima, the number of exercises must be increased to cover both take-off with HUD and increased minima without HUD.

Instructors should demonstrate in visual conditions the effectiveness of the localizer display or other lateral guidance equipment, as the aircraft deviates from the runway centreline.

Exercises must include:

- normal take-offs (2) (RVR 200 m, Crosswind 15 kts – RVR 150 m Crosswind 10 kts);
- engine failure near  $V_1$  (RTO) and engine failure at  $V_1$  (continue);
- loss of visibility at low speed (RTO) and after 100 kts (continue);
- pilot flying (PF) incapacitation; and
- deliberate runway centreline deviation.

### **Approach and landing, and go-around exercises**

There must be a minimum of eight approaches from at least 1 500 ft to either a landing or a go-around. However, additional exercises should be conducted to cover operator requirements and the training requirements mentioned above.

Instructors must demonstrate in the simulator the approach (Calvert and ALSF-2) and runway lighting and various visual segments that will permit a landing relating to CAT II, CAT IIIA, and CAT IIIB approaches, prior to students commencing low visibility landing exercises.

Instructors must provide varying RVR reports to the crew during some of the simulator exercises to ensure a correct understanding of approach bans.

Some suggested exercises are:

- Normal operations;
- Approaches resulting in missed approaches due to either lack of visual reference at DH or loss of visibility below DH;
- Aircraft and ground system failures;
- Loss of visibility above and below DH;
- Pilot (PF) incapacitation;
- Reversion to manual flight at or below CAT II DH to control flare, landing and rollout or missed approach;
- Reversion to higher minima;
- Fail passive CAT IIIA approach with autopilot disconnect below minima; and
- Engine failure at various stages of the approach and during the missed approach.

If the use of HUD is required, the number of exercises should be increased to cover take-offs and approaches with and without HUD.

**APPENDIX 2 TO CAAP LVO -1(0) –****REQUIREMENTS FOR GRANT OF AN AUTOLAND APPROVAL**

This appendix provides information on the standard requirements for grant of an approval to carry out autolands. Approval for autoland operations will normally be an essential prerequisite for grant of an exemption to conduct LV landings. However, CASA will look at requests for use of certified Enhanced Vision Systems (EVS) and Head Up Displays (HUD) in relation to CAT II for separate or single systems or CAT IIIA for combined or dual systems.

**1. Aircraft Certification**

Aircraft must be certified for autoland in the Aircraft Flight Manual. The Minimum Equipment List (MEL)/ Dispatch Deviations Guide (DDG) must indicate the equipment that is required to satisfy the certification requirements.

**2. Aircraft Maintenance Approved Data**

The Aircraft Maintenance Planning Document must specify:

- the frequency that the autoland system must be exercised to remain valid;
- the action to be taken in the event of autoland loss of validity; and
- any special maintenance requirements that the aircraft manufacturer has specified for autoland.

**3. Operations Manual**

The following must be included in an on-board Operations manual:

- a copy of the Autoland ‘Safety Operational Specification’.
- an instruction on how the autoland validity status will be indicated to the pilots if required by the AFM.
- in relation to CAT I Autoland:
  - autoland pilot procedures;
  - operator approved aircraft environmental limits;
  - runways approved for autoland;
  - approved landing configurations;
  - the aircraft equipment required in accordance with the MEL/DDG; and
  - an explanation of the ILS critical area.

**4. Autoland Training**

The training course syllabus for autoland and autoland procedures must be approved by CASA.

**5. Pilot requirements**

Pilots are approved to conduct autoland following type endorsement, provided approved autoland training has been given on that type. The pilot flying the autoland must be in the left hand seat.

Pilots must be assessed in autoland procedures in a simulator or line check at least every eight months.

## 6. Introduction of Aircraft to an Operator's Fleet

All aircraft must have successfully completed an autoland flown by the operator's pilots and without passengers, prior to being approved for autoland in revenue operations.

Where an operator introduces a new aircraft type, an autoland program, requiring approval by CASA, must be completed before the aircraft conducts landings in Category (CAT) II or III weather conditions.

## 7. Monitoring of Required Accuracy

As part of an internal reporting system pilots must indicate on a pilot reporting form provided by the operator and approved by CASA, each autoland as 'successful' or 'unsuccessful'. The forms, or an on-board operations manual, must show the parameters for the autoland to be classified as 'successful'.

An autoland report requires an evaluation of:

- the approach below 1000 ft;
- the touchdown; and
- the rollout.

An approach is considered to be successful if:

- From 500 ft to start of flare:
  - Speed is maintained within +/- 5 kts disregarding rapid fluctuations due turbulence;
  - No relevant system failure occurs;
- From 300 ft to DH:
  - No excessive deviation occurs; and
  - No centralised warning gives a go-around order.

An automatic landing is considered to be successful if:

- no system failure occurs;
- no flare failure occurs;
- no de-crab failure occurs;
- main wheel touchdown occurs in the touchdown area;
- nose wheel touchdown occurs within 8 m of centreline;
- bank angle at touchdown does not exceed 7 degrees;
- pitch angle at touchdown does not exceed the maximum value for a safe tail clearance;
- rollout lateral deviation does not exceed 8 m; or
- no rollout failure occurs.

Any malfunction of a relevant system used for the approach, landing or rollout will require the autoland to be classified as 'unsuccessful'.

The operator must analyse all 'unsuccessful' autolands in order to assess the continuing acceptability of aircraft equipment and runway ground systems and must retain the autoland forms and the analysis of 'unsuccessful' autolands for at least two years.

Unsuccessful autoland trends involving a particular runway are to be notified to CASA.

## 8. Approval of Runways for Autoland

Before a particular runway may be used for autoland operations, that runway must be approved by the 'Head of Flight Operations/Chief Pilot' or his or her nominee.

Where the runway is currently approved by the State of the aerodrome for CAT II or III operations and that the State is a compliant ICAO member, then no evaluation is required.

For runways that do not meet the above requirements, an evaluation is required and must confirm:

- the runway has an ILS of at least CAT I transmission quality with the localiser centreline coincident with the runway centreline;
- the nominal glideslope angle is between 2.5 and 3.0 degrees inclusive;
- the glidepath reference datum height (RDH) is between 48 and 70 ft inclusive. If RDH exceeds 59 ft, the landing distance available (LDA) must be reduced by the following distance 'D' (m) and published in the operations manual;

$$D = \frac{(RDH - 59)}{3.3 \times \tan \theta}$$

Where  $\theta$  = Glidepath angle

- the runway slope complies with ICAO Annex 14 Vol I, Chapter 3; and
- the pre-threshold terrain complies with ICAO Manual of All Weather Operations Doc 9365, Chapter 5 and Annex 14 Vol I 'Radio Altimeter Operating Area (Chapter 3 and Annex A).

Where confirmation cannot be established with any of the above criteria, the autoland assessment must be referred to the CASA for resolution.

## 9. Conducting an Autoland

Prior to commencing an approach for an autoland, the pilots must advise ATC of their intention. If ATC cannot provide protection of the ILS critical areas, pilots must ensure vigilance is maintained against any sudden flight path divergence.

Autolands must be conducted using approved autoland procedures.