

Advisory Circular

ALL WEATHER OPERATIONS (AWO)

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1. **GENERAL.** Pursuant to paragraph 88B of the Air Navigation Order, the Director General of the Civil Aviation Authority of Singapore (DGCA) may, from time to time, issue advisory circulars (ACs) on any aspect of safety in civil aviation. This AC contains information about standards, practices and procedures acceptable to CAAS. The revision number of the AC is indicated in parenthesis in the suffix of the AC number.
2. **PURPOSE.** This AC provides guidance to the operator applying for operational approval for All Weather Operations (AWO).
3. **APPLICABILITY.** This AC applies to all Singapore AOC holders.
4. **CANCELLATION.** This AC supersedes AC AOC-18(0) dated 23 July 2010.
5. **EFFECTIVE DATE.** This AC is effective from 1 October 2016.
6. **REFERENCES.** ICAO Doc 9365-AN/910.
7. **BACKGROUND.**
 - 7.1 All Weather Operation (AWO) is any taxi, take-off and landing operations in conditions where visual reference is limited by weather conditions.
 - 7.2 The operational approval granted by CAAS for AWO covers major elements such as the aircraft as a system, flight crew capabilities and flight procedures. The operational approval does not include aerodrome facilities.
 - 7.3 The operator must take cognizance of the physical and design characteristics of the runways and taxiways, pre-threshold terrain topography and back-up services of the aerodromes of intended operation and ensure that they are certified by the State of the Aerodrome to ICAO standard specifications.

8. LOW VISIBILITY TAXI AND TAKE-OFF.

- 8.1 When an aerodrome visibility drops below a pre-determined level, the local ATC may declare LVP (Low Visibility Procedure) operation in effect.
- 8.2 Pilots are required to follow LVP procedures and use specific aerodrome taxi charts to ensure correct taxiing to the intended runway for take-off.
- 8.3 Low visibility take-off (RVR below 400 m or RVR as promulgated by the aerodrome authority, whichever is the higher) is predicated by the declared RVRs for the three runway zones to provide adequate visual reference for accelerate-go as well as accelerate-stop.
- 8.4 For LVP operation, the operator shall ensure that its pilots are trained in accordance with the policy and procedures approved by CAAS.

9. CATEGORY II AND III OPERATIONS.

9.1 Airworthiness Requirements.

9.1.1 Aeroplane equipment authorization

- (a) The operator should include in his application to CAAS relevant pages of the AFM, TC, STC, TCDS and/or the aeroplane operations manual attesting that the aeroplane meets the relevant airworthiness requirements and performance criteria for, Category II (CAT II) and/or Category III (CAT III) operations as well as autoland capabilities, whichever is applicable.
- (b) The operator should also include any promulgated limitations or procedures necessary for safe operation, such as:
 - (1) DA/H or AOM limitations;
 - (2) Minimum airborne equipment prior to commencement of the AWO approach;
 - (3) Equipment operating procedures and sequences;
 - (4) Aircraft performance data; and
 - (5) Any factors affecting the aeroplane AWO operations.

9.1.2 Continuing Airworthiness Maintenance Procedures (CAMP)

- (a) The operator shall maintain the aeroplane in accordance with the approved CAMP with specific programmes for lower landing minima or low visibility take-off. The CAMP should include at least the following:
 - (1) Maintenance procedures to ensure continued airworthiness relative to low visibility operations;
 - (2) Procedure to revise and update the maintenance programme.
- (b) The operator shall also ensure that maintenance personnel are trained in accordance with training programmes approved by CAAS.

9.2 Flight Operations Requirements

9.2.1 Flight Crew Qualification. The operator should include the following structured courses in the flight crew training programmes for low visibility operation:

(a) Ground Training

- (1) the characteristics, capabilities and limitations of the nav aids involved including the effect on airplane system performance of interference to the ILS signal caused by other landing, departing or overflying airplanes, and the effect of the infringement of ILS critical and sensitive areas by airplanes or vehicles in the maneuvering area;
- (2) the characteristics of the visual aids (e.g. approach lighting, touchdown zone lighting, centre line lighting).
- (3) the operation, capabilities and limitations of the airborne systems (e.g. the automatic flight control systems; monitoring and warning devices; flight instruments, including altimetry systems; and the means the pilot has to assess the position of the airplane during the approach, touchdown and rollout);
- (4) approach, including missed approach procedures and techniques, along with descriptions of the factors affecting height loss during missed approach in normal and abnormal airplane configurations;
- (5) the use and limitations of RVR, including the applicability of RVR readings from different positions on the runway, the different methods of assessing RVR, the conversion method of visibility into an RVR in some States, and the limitations associated with each method;
- (6) the basic understanding of obstacle limitation and the obstacle-free zone, including missed approach design criteria and obstacle clearance for Category II and III operations (refer to PANS-OPS, Volume I);
- (7) the effects of low-level wind shear, turbulence and precipitation;
- (8) pilot tasks at decision height, and procedures and techniques for transition from instrument to visual flight in low visibility conditions.
- (9) action to be taken if the visual reference becomes inadequate when the airplane is below decision height, and the technique to be adopted for transition from visual to instrument flight should a go-around become necessary at these low heights;
- (10) use of alert height and appropriate actions;
- (11) action to be taken in the event of failure of approach and landing equipment above and below decision height;
- (12) recognition of and action to be taken in the event of failure of ground equipment;
- (13) significant factors in the determination of decision height (Annex 6);
- (14) effect of specific airplane malfunctions (e.g. engine failure) on auto-throttle, auto-pilot performance, etc.;
- (15) procedures and precautions to be followed while taxiing during limited visibility conditions; and
- (16) the existence and effects of visual illusions.

- (b) Flight Simulator and/or Airplane Flight Training
- (1) approaches with all engines operating, and with an engine inoperative, using the appropriate flight guidance and control systems installed in the aeroplane down to the appropriate minimum height, without external visual reference, followed by transition to visual reference and landings;
 - (2) approaches with all engines operating, and with an engine inoperative, using the appropriate flight guidance and control systems installed in the aeroplane down to the appropriate minimum height, followed by missed approaches, all without external visual reference;
 - (3) approaches utilizing the automatic flight control and landing system, followed by reversion to manual control for flare and landing after disconnecting the automatic system at low level, if appropriate;
 - (4) approaches utilizing the automatic flight control and landing system with automatic flare, automatic landing and, where appropriate, automatic roll-out;
 - (5) procedures and techniques for reversion to instrument flight and the execution of a missed approach from DA/H, including obstacle clearance aspects; and
 - (6) go-around from a height below decision height which may result in a touchdown on the runway in cases of a go-around initiated from a very low altitude, e.g. such as to simulate failures or loss of visual reference prior to touchdown.

10. APPLICATION FOR APPROVAL.

- 10.1 The operator should arrange to meet CAAS as soon as possible, at least 90 working days in advance of his plan to engage in all weather operations.
- 10.2 CAAS's 5-step structured process is applicable and it comprises: Pre-application meeting, Formal application, Document evaluation/assessment, Flight proving/validation and Award or rejection of application.
- 10.3 The application package should include the following items:
- (a) Application letter with statement on operating experience, types of aircraft and currently approved Instrument Approach Procedure (IAP);
 - (b) AWO category applied for and with the relevant minima, LVP if applicable;
 - (c) List of destination and alternate aerodromes with categorization approved for AWO operations;
 - (d) Relevant pages of AFM, Operations manual stating operator operating policy and/or procedures and, training programmes; and
 - (e) Proposed timeline, if any, for the completion of aeroplane and crew qualification.
- 10.4 The grant of operational approval depends on successful evaluation of the submitted documents, approval and validation of crew training programmes, and compliance with requirements set out in paragraph 9.

11. ADDITIONAL REQUIREMENTS.

11.1 Operational Demonstration

- (a) The purpose of operational demonstration is to determine or validate the use and effectiveness of the applicable aeroplane flight guidance system (including HUDLS if any), crew procedures, training, maintenance programmes and operating policy and/or procedures applicable to CAT II/III operations.
- (b) Operational demonstration is applicable to the introduction and the approval of low visibility operations for new aeroplane type and the requirements are as follows:
 - (1) At least 30 approaches and landings must be accomplished utilizing onboard CAT II/III system of the aeroplane type if the requested DH is 50 ft or higher;
 - (2) If the DH is less than 50ft, at least 100 approaches and landings must be accomplished;
 - (3) Unsuccessful approaches such as those due to unsatisfactory landings or system disconnect, shall not exceed 5% of the total. In such instance, the evaluation programme must be extended in step increments of 10 approaches and landings until over-all failure rate does not exceed 5%; and
 - (4) On a case by case basis, CAAS may consider granting credits in the form of reduction to the number of required approaches and landings based on the operator's experience gained from operating other aeroplane-type.
- (c) The operator shall develop a data collection method to record approach and landing performance which should include the following information:
 - (1) Deficiencies relating to airborne equipment that causes inability initiate an approach;
 - (2) Reasons for abandoning an approach and the altitude above the runway where the approach was discontinued or the autoland system disengaged; and
 - (3) Touchdown and/or rollout: A landing is considered satisfactory if the autopilot or pilot is able to correct, with normal control input, the lateral velocity so as to remain within the lateral confines of the runway. The data for the record should include, at touchdown, the approximate lateral and longitudinal position, indicated airspeed and the sink rate.
 - (4) A summary of the operational demonstration data shall be made available to CAAS for evaluation.

11.2 **Continuous monitoring**

11.2.1 After initial authorization, the operator must continuously monitor the operations to detect any undesirable trends. An acceptable method is by flight crew report.

11.2.2 The operator shall retain for a period of 12 months, information on:

- (a) Total number of satisfactory CAT II/III approaches by aeroplane-type; and
- (b) Reports of unsatisfactory approaches and/or autolands by aerodrome and aeroplane registration on the following:
 - (1) Airborne equipment faults;
 - (2) Ground facility difficulties;
 - (3) Any other reasons.

- (c) Additionally, the operator shall establish a procedure to monitor the performance of the autoland system and/or HUDLS to touchdown, as appropriate, of each aeroplane.

11.2.3 Any unsatisfactory report shall be thoroughly investigated.

11.3 **Aerodromes and Runways**

11.3.1 The aeroplane-type versus the runway must be verified by successful completion of at least one landing in CAT II or better conditions prior to commencing CAT III operations;

11.3.2 Runways with irregular pre-threshold terrain or other perceived or known deficiencies must be satisfactorily verified in CAT I or better conditions before lowering in steps to CAT II followed by CAT III.

11.4 **Aeroplane and Crew Recency**

11.4.1 To maintain aeroplane CAT III approach and autoland currency, the aeroplane must successfully complete an autoland within the previous 28 day period.

11.4.2 Flight crew CAT II/III recency is maintained by a minimum number CAT II/III approaches with autolands conducted either in flight or in a CAAS-approved flight simulator. The number and the conduct of the exercise, as in the case of the use of a flight simulator, shall be approved by CAAS.

11.5 **Transition period**

11.5.1 An operator without prior CAT II experience may be approved for CAT II or CAT IIIA operations after having gained a minimum experience of 6 months of CAT I operations on the aeroplane type.

11.5.2 A current CAT II or CAT III operator introducing a new aeroplane-type may be approved for CAT II or CAT IIIA operations for a CAAS-approved transition period (normally 6 months) before being granted approval for lower category operations.

12. **WITHDRAWAL OF APPROVAL.**

12.1 To ensure safety of operation the operator should take positive steps which may include suspending the aeroplane or crew from AWO operations.

12.2 Violation or failure to comply with AWO operating requirements may result in withdrawal of the approval by CAAS.