CIVIL AVIATION GUIDANCE MATERIAL – 6008(III)

LOW VISIBILITY OPERATIONS

LVO

CIVIL AVIATION AUTHORITY OF MALAYSIA

ISSUE 01
REVISION 01 – 15TH NOVEMBER 2021

INTENTIONALLY LEFT BLANK

Introduction

This Civil Aviation Guidance Material 6008 Part III (CAGM – 6008 (III)) is issued by the Civil Aviation Authority of Malaysia (CAAM) to provide guidance for maintenance and operators of the aircraft in Low visibility Operations, pursuant to Civil Aviation Directives 6 Part 1 – Commercial Air Transport (CAD 6 Part 1 – CAT), Civil Aviation Directives 6 Part 2 – General Aviation (CAD 6 Part 2 – GA) and Civil Aviation Directives 6 Part 3 – Helicopters (CAD 6 Part 3 – HELI) (collectively referred to as "CAD").

Organisations may use these guidelines to ensure compliance with the respective provisions of the relevant CAD's issued. Notwithstanding the Regulation 204 and Regulation 205 of the Malaysian Civil Aviation Regulations 2016 (MCAR 2016), when the CAGMs issued by the CAAM are complied with, the related requirements of the CAD's may be deemed as being satisfied and further demonstration of compliance may not be required.

(Captain Chester Voo Chee Soon)
Chief Executive Officer
Civil Aviation Authority of Malaysia

Civil Aviation Guidance Material components and Editorial practices

This Civil Aviation Guidance Material is made up of the following components and are defined as follows:

Standards: Usually preceded by words such as *"shall"* or *"must"*, are any specification for physical characteristics, configuration, performance, personnel or procedure, where uniform application is necessary for the safety or regularity of air navigation and to which Operators must conform. In the event of impossibility of compliance, notification to the CAAM is compulsory.

Recommended Practices: Usually preceded by the words such as "*should"* or "*may*", are any specification for physical characteristics, configuration, performance, personnel or procedure, where the uniform application is desirable in the interest of safety, regularity or efficiency of air navigation, and to which Operators will endeavour to conform.

Appendices: Material grouped separately for convenience but forms part of the Standards and Recommended Practices stipulated by the CAAM.

Definitions: Terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have an independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

Tables and Figures: These add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

Notes: Included in the text, where appropriate, Notes give factual information or references bearing on the Standards or Recommended Practices in question but not constituting part of the Standards or Recommended Practices;

Attachments: Material supplementary to the Standards and Recommended Practices or included as a guide to their application.

The units of measurement used in this document are in accordance with the International System of Units (SI) as specified in CAD 5. Where CAD 5 permits the use of non-SI alternative units, these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this document, which is identified by a number and/or title, includes all subdivisions of that portion.

Throughout this Civil Aviation Guidance Material, the use of the male gender should be understood to include male and female persons

Record of Revisions

Revisions to this CAGM shall be made by authorised personnel only. After inserting the revision, enter the required data in the revision sheet below. The *'Initials'* has to be signed off by the personnel responsible for the change.

ISS/REV No.	Revision Date	Revision Details	Initials
ISS01/REV01	15th November 2021	Refer to Summary of Changes	CAAM

INTENTIONALLY LEFT BLANK

Summary of Changes

ISS/REV No.	Item no.	Revision Details
ISS01/REV01	Attachment A	Removed and link provided.

INTENTIONALLY LEFT BLANK

Table of Contents

1 Low Visibility Operations (LVO)

1.1 Introduction

1.1.1 As an integral part of an aerodrome operator's Safety Management System (SMS), Low Visibility Procedures (LVP) should be developed and established at all certified airports operating in low visibility conditions.

1.1.2 The operational approval granted by CAAM for LVO covers such major elements such as the aircraft as a system, flight crew capabilities and flight procedures. The operational approval does not include aerodrome facilities.

1.1.3 The operator must take cognisance 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.

1.1.4 CAD 6 outlines the regulatory requirements to establish such procedures for all relevant operational areas at the aerodrome.

1.2 Purpose

1.2.1 The purpose of this document is to provide guidance to demonstrate compliance with requirements regrading, and information related to an application, for an approval for LVO.

1.3 Responsibility

1.3.1 The implementation and continued compliance of the requirements contained in these Low Visibility Regulations is the responsibility of the operator.

1.4 Scope

1.4.1 This CAGM is applicable to the operator seeking an approval for low visibility operations.

1.5 Definitions

Alert Height (AH) is the height above the runway threshold based on the characteristics of the aircraft and its fail operational landing system, above which a Category III operation would be is continued and a missed approach initiated if a failure occurred in one of the redundant parts of the landing system, or in the relevant ground equipment.

Automatic flight control system (AFCS) with ILS coupled approach mode Is an airborne system which provides automatic control of the flight path of the aircraft by reference to the ILS.

Automatic landing system is the airborne system which provides automatic control of the aircraft during the approach and landing, approximately 15 m (50 ft) above the landing runway threshold or the point where the flare manoeuvre should begin for the type of aircraft flown.

Airworthiness inspector (AWI) is a representative of the civil aviation authority in charge of initial authorisation and/or continued oversight of the operator's maintenance and engineering organisation and processes. The assessment performed by the AWI may include (but not be limited to):

a) the adequacy of maintenance facilities, equipment and procedures;

b) the adequacy of the training programmes and competence of employees;

c) the adequacy of the programme or schedule for periodic maintenance and overhauls; and

d) the airworthiness of the aircraft.

Classification of aircraft is the criteria taken into consideration for the classification of aircrafts by categories is the indicated airspeed at threshold (VAT) which is equal to the stalling speed (VSO) multiplied by 1.3 or stall speed VS1G multiplied by 1.23 in the landing configuration at the maximum certificated landing mass. If both VSO and VS1G are available, the higher resulting VAT must be applied.

The aircraft categories corresponding to VAT values are in the Table below:

Aircraft Category	VAT
A	Less than 91 kt
B	From 91 to 120 kt
C	From 121 to 140 kt
D	From 141 to 165 kt
E	From 166 to 210 kt

The landing configuration which is to be taken into consideration is defined by the operator or by the aircraft manufacturer.

Permanent change of category (maximum landing mass):

a) An operator may impose a permanent, lower, landing mass, and use this mass for determining the VAT if approved by the CAAM.

b) The category defined for a given aircraft is a permanent value and thus independent of the changing conditions of day to day operations.

Decision altitude (DA) or decision height (DH) is a specified altitude or height in the precision approach or approach with vertical guidance at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

Note 1. Decision altitude (DA) is referenced to mean sea level and decision height (DH) is referenced to the threshold elevation.

Note 2. The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In Category III operations with a decision height the required visual reference is that specified for the particular procedure and operation.

Note 3. For convenience where both expressions are used, they may be written in the form "decision altitude/height" and abbreviated "DA/H".

Enhanced vision system (EVS) is a system to display electronic real-time images of the external scene achieved through the use of image sensors.

Fail-operational automatic landing system means an automatic landing system is fail-operational if, in the event of a failure, the approach, flare and landing can be completed by the remaining part of the automatic system.

Fail-passive automatic landing system means an automatic landing system is fail-passive if, in the event of a failure, there is no significant deviation of aircraft trim, flight path or attitude but the landing will not be completed automatically.

Flight operations inspector (FOI) is a representative of the civil aviation authority in charge of initial authorisation and/or continued oversight of the operator's flight operations organisation and processes. The assessment performed by the FOI may include (but not be limited to):

a) the adequacy of flight operations facilities, equipment and procedures;
b) the adequacy of the training programmes and competence of employees; and
c) the adequacy of the programme to ensure safe operations of the aircraft.

Head-up display (HUD) is a display system that presents flight information into the pilot's forward external field of view.

Head-up display (HUD) approach and landing guidance system (HUDLS) is an airborne instrument system which presents sufficient information and guidance in a specific area of the aircraft windshield, superimposed for a conformal view with the external visual scene, which permits the pilot to manoeuvre the aircraft manually by reference to that information and guidance alone to a level of performance and reliability that is acceptable for the category of operation concerned.

***Hybrid Head Up Display Landing System (hybrid HUDLS*)** is a system which consists of a primary fail-passive automatic landing system and a secondary independent HUD/HUDLS enabling the pilot to complete a landing manually after failure of the primary system.

Note: Typically, the secondary independent HUD/HUDLS provides guidance which normally takes the form of command information, but it may alternatively be situation (or deviation) information.

ILS critical area is an area of defined dimensions about the localizer and glide path antennas where vehicles, including aircraft, are excluded during all ILS operations.

Note. The critical area is protected because the presence of vehicles and/or aircraft inside the boundaries will cause unacceptable disturbance to the ILS signal-in-space.

ILS sensitive area is an area extending beyond the critical area where the parking and/or movement of vehicles, including aircraft, is controlled to prevent the possibility of unacceptable interference to the ILS signal during ILS operations.

Note. The sensitive area is protected to protection against interference caused by large moving objects outside the critical area but still normally within the airfield boundary.

Instrument approach procedure is a series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding

or en-route obstacle clearance criteria apply. Instrument approach procedures are classified as follows:

Non-precision approach (NPA) procedure is an instrument approach procedure which utilises lateral guidance but does not utilise vertical guidance.

Approach procedure with vertical guidance (APV) is an instrument approach procedure which utilises lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

Precision approach (PA) procedure Is an instrument approach procedure using precision lateral and vertical guidance with minima as determined by the category of operation.

Note.— Lateral and vertical guidance refers to the guidance provided either by:

a) a ground-based navigation aid; or b) computer-generated navigation data

Categories of precision approach and landing operations (ICAO DOC9365.)

Category I (CAT I) operations.

A precision instrument approach and landing with:

a) a decision height not lower than 60 m (200 ft); and

b) with either a visibility not less than 800 m or a runway visual range not less than 550m.

Category II (CAT II) operations.

A precision instrument approach and landing with:

a) a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft); and

b) a runway visual range not less than 300 m.

Category III (CAT III) operations.

A precision instrument approach and landing with:

a) a decision height lower than 30 m (200 ft) or no decision height; and

b) a runway visual range less than 300m or no runway visual range limitations.

***Low visibility procedures (LVP*)** are specific procedures applied at an aerodrome for the purpose of ensuring safe operations during Category II and III approaches and/or low visibility take-offs.

***Low visibility take-off (LVTO*)** is a term used in relation to flight operations referring to a take-off on a runway where the RVR is less than 400 m.

Required visual reference means the section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path.

Rollout control/guidance system is a system which provides either automatic control or instrument guidance for manual control of lateral steering for rollout until manual control of the aircraft by visual reference is assured.

Runway visual range (RVR) means 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.

State of the Aerodrome is the State in whose territory the aerodrome is located.

State of the Operator is the State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

State of the Registry is the State on whose register the aircraft is entered.

Stabilised approach refers to an approach which is flown in a controlled and appropriate manner in terms of configuration, energy and control of the flight path from a pre-determined point or altitude/height down to a point 50 feet above the threshold or the point where the flare manoeuvre is initiated, if higher.

Touchdown zone is the portion of a runway, beyond the threshold, where it is intended landing aircrafts first contact the runway.

Visual approach is an approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed by visual reference to terrain.

1.5.1 Abbreviations

AC 120-28D	=	(FAA advisory circular) Criteria for approval of category III weather minima for takeoff, landing, and rollout
AC 120-29A	=	(FAA advisory circular) Criteria for approval of category I and category II weather minima for approach
AH	=	Alert Height
AFCS	=	Automatic Flight Control System
ALS	=	Automatic Landing System
ATS	=	Air Traffic Services
Cat I	=	Category I precision instrument approach
Cat II	=	Category II precision instrument approach
Cat III	=	Category III precision instrument approach
CS-AWO	=	EASA document on certification specifications, including airworthiness codes and acceptable means of compliance, for all weather operations (« CS-AWO »)
DA/H	=	Decision Altitude/Height
EASA	=	European Aviation Safety Agency
EVS	=	Enhanced Vision System
FATO	=	Final Approach and Take-off Area
FGS	=	Flight Control/Guidance System
Ft	=	Feet
HUD	=	Head Up Display
HUDLS	=	Head Up Display Landing System
ILS	=	Instrument Landing System
LVP	=	Low Visibility Procedures
LVTO	=	Low Visibility Take Off
M	=	Meters
RVR	=	Runway Visual Range
SMGCS	=	Surface Movement and Guidance and Control System

2 Certification – Aeroplanes and Helicopters

2.1 General

2.1.1 In this CAGM, low visibility operations mean all procedures applied for the purpose of ensuring safe aircraft operations during Category II, III approaches and low visibility take-offs.

2.1.2 CAAM certification procedures are outlined in this CAGM.

2.1.3 The required information shall be provided to the CAAM by an air operator applying for LVO operations at least 60 working days prior to the intended start of LVO operations.

2.1.4 Any questions not covered herein, or any point of apparent conflict requiring resolution, should be referred to the CAAM.

2.2 Application for low visibility operations

2.2.1 The approval process consists of the following phases:

2.2.1.1 ***Step 1 — Pre-application phase:*** Prior to initiating the approval process, the operator will review the requirements and guidelines outlined in the relevant regulations, CADs, and CAGMs which are published by the CAAM.

A pre-application usually commences when a prospective applicant makes his initial inquiries regarding application for an approval in the form of a letter or a personal visit to the CAAM. If the proposed application is complex, the operator may need to obtain advice and assistance from OEMs or other design organisations, training establishments, data providers, etc.
This Phase will include both Flight Operations and Airworthiness division to assist the applicant in queries and highlighting the requirements.

2.2.1.2 ***Step 2 — Formal application phase:*** The operator submits to the CAAM a formal, written application for approval, the CAAM will then appoint a Specific Approvals Manger (SAM) to oversee the application

Note. – An example application form is contained in Attachment A.

2.2.1.3 ***Step 3 — Document evaluation phase:*** The CAAM FOI and AWI evaluate the formal written application for approval to determine if all the requirements are being met. The FOI and AWI, may need to obtain advice and assistance from other departments within CAAM or organisations such as regional agencies or experts in other States.

2.2.1.4 ***Step 4 – Demonstration and inspection phase:*** During a formal inspection by the FOI and AWI (assisted as necessary by a team from the CAAM), the operator demonstrates how the requirements are being met.

2.2.1.5 ***Step 5 – <u>Approval phase:</u>*** Following a successful formal inspection by the CAAM, approval is given via:

a) an amendment to the OM; and

b) an Ops Spec associated with the AOC; or

c) a LOA

Note 1. – The demonstration and inspection phase may not be required depending upon the type of operation used, subject to the consideration of the CAAM.

2.2.2 Commercial operators of foreign registry,

a) who operate a scheduled or regular service into Malaysia and whose aircraft, equipment and crews meet or exceed the criteria described in this CAGM, may apply to CAAM for authority to conduct Category II/III operations in Malaysia aerodromes deemed suitable.

b) In all such cases, approval for Category II/III operations in the state of registry may qualify as a prior condition for approval to conduct Category II/III operations in Malaysia.

2.3 Approval criteria

2.3.1 Requests for landing operations in the CAT II/III range of weather minima will be considered if the following criteria (set out in greater detail in the chapters in this CAGM) are met:

a) The aircraft has suitable flight characteristics, an approved list of equipment and acceptable continuing maintenance programme;

b) The aircraft is operated by a qualified crew in conformity with laid down procedures; and

c) The aerodrome intended to be used is suitably equipped and maintained.

2.3.2 The application for approval of landing operations in CAT II/III weather minima consists of the application form in Appendix 7.1 and evidence of compliance to the items required in 2.3.1

2.4 Operational demonstration.

2.4.1 General.

2.4.1.1 The following procedures are applicable to the initial introduction and approval of low visibility operations.

2.4.1.2 The number of approaches made during initial operational evaluation will vary depending on the capabilities of the aircraft and operator’s experience.

2.4.2 Aeroplanes

2.4.2.1 Operational Demonstration.

2.4.2.1.1 The purpose of the operational demonstration is to determine or validate the operator's use and effectiveness of the applicable aircraft flight guidance systems, including HUDLS if appropriate, training, flight crew procedures, maintenance programme, and manuals applicable to the Category II/III programme being approved.

a) At least 30 approaches and landings must be accomplished by the operator in line operations using the Category II/III systems installed in each aircraft type if the requested DH is 50 ft or higher. If the DH is less than 50 ft, at least 100 approaches and landings will need to be accomplished unless otherwise approved by the CAAM. All approaches for the purpose of these demonstrations, in the interest of safety, should be conducted in Category I or better weather conditions.

b) On a case-by-case basis, the CAAM 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 different variants of the same type of aircraft utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type of aircraft.

c) If the number of unsuccessful approaches exceeds 5% of the total (e.g. unsatisfactory landings, system disconnects) the evaluation programme must be extended in steps of at least 10 approaches and landings until the overall failure rate does not exceed 5 %.

2.4.2.1.2 The Operator should establish a data collection method to record approach and landing performance. The resulting data and a summary of the demonstration data should be made available to the CAAM for evaluation.

2.4.2.1.3 Unsatisfactory approaches and/or automatic landings and all equipment failures should be documented and analysed.

2.4.2.1.4 Demonstrations may be conducted in a FSTD (applicable to the aircraft type), line operations or any other flight where the operator's procedures are being used.

2.4.2.1.5 In unique situations where the completion of 100 successful landings could take an unreasonably long period of time and equivalent reliability assurance can be achieved, a reduction in the required number of landings may be considered on a case-by-case basis.

2.4.2.1.6 Reduction of the number of landings to be demonstrated requires a justification for the reduction. This justification should take into account factors such as a small number of aircraft in the fleet, limited opportunity to

use runways having CAT II/III procedures or the inability to obtain ATS sensitive area protection during good weather conditions. However, at the operator's option, demonstrations may be made on other runways and facilities.

2.4.2.1.7 Sufficient information should be collected to determine the cause of any unsatisfactory performance (e.g. sensitive area was not protected, ATC instructions, etc.).

2.4.2.1.8 If the operator has different variants of the same type of aircraft utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type or class of aircraft, the operator should show that the various variants have satisfactory performance, but need not conduct a full operational demonstration for each variant.

2.4.2.1.9 Not more than 30 % of the demonstration flights should be made on the same runway.

2.4.2.2 Data collection for operational demonstrations.

Note: Demonstration data may be requested by the CAAM.

2.4.2.2.1 The operator should establish a reporting system to enable checks and periodic reviews to be made during the operational evaluation period before the operator is approved to conduct CAT II or III operations. The reporting system should cover all successful and unsuccessful approaches, with reasons for the latter, and include a record of system component failures. This reporting system should be based upon flight crew reports and automatic recordings as prescribed in 2.4.2.2.2, 2.4.2.2.3, 2.4.2.2.4 below. The recordings of approaches may be made during normal line flights or during other flights performed by the operator.

2.4.2.2.2 Data should be collected whenever an approach and landing are attempted utilising the CAT II/III system, regardless of whether the approach is abandoned, unsatisfactory, or is concluded successfully.

2.4.2.2.3 The data should, as a minimum, include the following information:

a) Inability to initiate an approach. Identify deficiencies related to airborne equipment that preclude initiation of a CAT II/III approach.

b) Abandoned approaches. Give the reasons and altitude above the runway at which approach was discontinued or the automatic landing system was disengaged.

c) Touchdown or touchdown and rollout performance. Describe whether or not the aircraft landed satisfactorily within the desired touchdown area with lateral velocity or cross track error that could be corrected by the pilot or automatic system so as to remain within the lateral confines

of the runway without unusual pilot skill or technique. The approximate lateral and longitudinal position of the actual touchdown point in relation to the runway centre line and the runway threshold, respectively, should be indicated in the report. This report should also include any CAT II/III system abnormalities that required manual intervention by the pilot to ensure a safe touchdown or touchdown and rollout, as appropriate.

2.4.2.2.4 In addition to the 2.4.2.2.3 the following information should be gathered:

a) the aerodrome and runway used;

b) weather conditions;

c) time;

d) reason for failure leading to an aborted approach;

e) adequacy of speed control;

f) trim at time of automatic flight control system disengagement;

g) compatibility of automatic flight control system;

h) flight director and raw data; and

i) an indication of the aeroplane's position relative to the ILS centre line and glide path when descending through 30m (100ft).

2.4.2.3 Data analysis.

2.4.2.3.1 Unsuccessful approaches due to the following factors may be excluded from the analysis but annotated accordingly.

a) ATS factors. Examples include situations in which a flight is vectored too close to the final approach fix/point for adequate localizer and glide slope capture, lack of protection of ILS sensitive areas, or ATS requests the flight to discontinue the approach.

b) Faulty Navaid signals. Navaid (e.g. ILS localizer) irregularities, such as those caused by other aircraft taxiing, over-flying the Navaid (antenna).

c) Other factors. Any other specific factors that could affect the success of CAT II/ III operations that are clearly discernible to the flight crew should be reported.

2.4.3 Helicopters

2.4.3.1 The operator should comply with the provisions prescribed below when introducing into CAT II or III service a helicopter type.

a) Operational reliability

1) The CAT II and III success rate should not be less than that required by CS-AWO or equivalent.

b) Criteria for a successful approach. An approach is regarded as successful if:

1) The criteria are as specified in CS-AWO or equivalent are met; and

2) No relevant helicopter system failure occurs.

Note: For helicopter types already used for CAT II or III operations in another State, the in-service proving programme in 2.4.3.5 should be used instead.

2.4.3.2 Data collection during airborne system demonstration – general

a) The operator should establish a reporting system to enable checks and periodic reviews to be made during the operational evaluation period before the operator is approved to conduct CAT II or III operations. The reporting system should cover all successful and unsuccessful approaches, with reasons for the latter, and include a record of system component failures. This reporting system should be based upon flight crew reports and automatic recordings as prescribed in 2.4.3.3 and 2.4.3.4.

b) The recordings of approaches may be made during normal line flights or during other flights performed by the operator.

2.4.3.3 Data collection during airborne system demonstrations – operations with DH not less than 50 ft

a) For operations with DH not less than 50 ft, data should be recorded and evaluated by the operator and evaluated by the CAAM when necessary

b) It is sufficient for the following data to be recorded by the flight crew:

1) FATO and runway used;

2) Weather conditions;

3) Time;

4) Reason for failure leading to an aborted approach;

5) Adequacy of speed control;

6) Trim at time of automatic flight control system disengagement;

7) Compatibility of automatic flight control system, flight director and raw data;

8) An indication of the position of the helicopter relative to the ILS, MLS centreline when descending through 30 m (100 ft); and

9) Touchdown position.

c) The number of approaches made during the initial evaluation should be sufficient to demonstrate that the performance of the system in actual

airline service is such that a 90 % confidence and a 95 % approach success will result.

2.4.3.4 Data collection during airborne system demonstration – operations with DH less than 50 feet or no DH

a) For operations with DH less than 50 ft or no DH, a flight data recorder (FDR), or other equipment giving the appropriate information, should be used in addition to the flight crew reports to confirm that the system performs as designed in actual airline service. The following data should be recorded:

1) distribution of ILS, MLS deviations at 30 m (100 ft), at touchdown and, if appropriate, at disconnection of the rollout control system and the maximum values of the deviations between those points; and

2) sink rate at touchdown.

b) Any landing irregularity should be fully investigated using all available data to determine its cause.

2.4.3.5 In-service Proving

a) The system should demonstrate reliability and performance in line operations consistent with the operational concepts. A sufficient number of successful landings should be accomplished in line operations, including training flights, using the auto-land and rollout system installed in each helicopter type.

b) The demonstration should be accomplished using CAT II or CAT III ILS. Demonstrations may be made on other ILS facilities if sufficient data are recorded to determine the cause of unsatisfactory performance.

c) If the operator has different variants of the same type of helicopter utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type of helicopter, the operator should show that the variants comply with the basic system performance criteria, but the operator need not conduct a full operational demonstration for each variant.

d) Where the operator introduces a helicopter type that has already been approved by the CAAM for CAT II and/or CAT III operations, a reduced proving programme may be acceptable

2.5 Transitional periods

2.5.1 Operators with no previous Category II experience

a) The operator without previous CAT II operational experience, applying for a CAT II operational approval, should demonstrate to the CAAM that it has

gained a minimum experience of 6 months of CAT I operations on the aircraft type

b) The operator applying for a CAT III operational approval should demonstrate to the CAAM that it has already completed 6 months of CAT II operations on the aircraft type.

2.5.2 Operators with previous CAT II or III experience

a) The operator with previous CAT II or CAT III experience, applying for a CAT II or CAT III operational approval with reduced transition periods as set out in (a), should demonstrate to the CAAM that it has maintained the experience previously gained on the aircraft type.

b) An operator authorised for Category II or III operations using auto-coupled approach procedures, with or without auto-land, and subsequently introducing manually flown Category II or III operations using a HUDLS should be considered to be a “New Category II / III operator” for the purposes of the demonstration period provisions.

2.6 Eligible aerodromes and runways

2.6.1 Each aircraft type (variant)/runway combination must be verified by the successful completion of at least one approach and landing in Category II or better conditions, prior to commencing Category III operations.

2.6.2 For runways with irregular pre-threshold terrain or other foreseeable or known deficiencies, each aircraft type/runway combination must be verified by operations in Category I or better conditions, prior to commencing Category II, or Category III operations.

2.6.3 If the operator has different variants of the same type of aircraft in accordance with 2.6.4, utilising the same basic flight control and display systems, or different basic flight control and display systems on the same type of aircraft in accordance with 2.6.4, the operator should show that the variants have satisfactory operational performance, but need not conduct a full operational demonstration for each variant/runway combination.

2.6.4 An aircraft type or variant of an aircraft type is deemed to be the same type/variant of aircraft if that type/variant has the same or similar:

a) Level of technology, including the:

1) FGS and associated displays and controls;

2) The FMS and level of integration with the FGS;

3) Use of HUDLS.

b) Operational procedures, including:

1) Alert height;

2) Manual landing/automatic landing;

3) No decision height operations;

4) Use of HUD/ HUDLS in hybrid operations.

c) Handling characteristics, including:

1) Manual landing from automatic or HUDLS guided approach;

2) Manual go-around from automatic approach;

3) Automatic/ manual roll out.

2.7 Certification standards

2.7.1 Following are the certification standards for;

a) Precision approach - Category II

b) Precision approach - Category III

c) Low visibility take-off (LVTO)

2.8 Precision approach — Category II operations

2.8.1 A Category II operation is a precision instrument approach and landing using ILS or MLS with:

a) A decision height below 200 ft but not lower than 100 ft; and

b) A runway visual range of not less than 300 m

2.8.2 Decision height.

An operator must ensure that the decision height for a Category II operation is not lower than:

a) The minimum decision height specified in the AFM, if stated;

b) The minimum height to which the precision approach aid can be used without the required visual reference;

c) The OCH for the category of aircraft;

d) The decision height to which the flight crew is authorised to operate; or

e) 100 ft.

2.8.3 Visual reference.

A pilot may not continue an approach below the Category II decision height determined in accordance with 2.8.2 above unless visual reference containing a segment of at least three consecutive lights that depict the centre line of the

approach lights or touchdown zone lights or runway centre line lights or runway edge lights or a combination of these is attained and can be maintained. This visual reference should include a lateral element of the ground pattern, i.e. an approach lighting crossbar or the landing threshold or a barrette of the touchdown zone lighting, unless the operation is conducted utilising an approved HUDLS to touchdown.

2.8.4 Required RVR.

The lowest minima to be used by an operator for Category II operations are:

RVR for Category II approach vs DH

Category II minima		
Decision height	Auto-coupled to below DH (Note 1a)	
	RVR/Aircraft category A,B and C	RVR/Aircraft category D
100 ft - 120 ft	300 m	300 m / 350 m (Note 2a)
121 ft - 140 ft	400 m	400 m
141 ft - 199 ft	450 m	450 m
Note 1a: The reference to “Auto-Coupled to below DH” in this table means continued use of the automatic flight control system down to a height which is not greater than 80 per cent of the applicable DH. Thus, airworthiness requirements may, through minimum engagement height for the automatic flight control system, affect the DH to be applied. Note 2a: For a CAT D aircraft conducting an autoland, 300 m may be used.		

2.9 Precision approach — Category III operations

2.9.1 General

2.9.2 A Category III operation is a precision instrument approach and landing using ILS or MLS with:

a) A decision height lower than 30 ft or no decision height; and

b) A runway visual range of less than 300 m or no runway visual range.

Note 1.— Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach operation would be conducted in accordance with the requirements of the most demanding category (e.g. an operation with a DH in the range of CAT II but with an RVR in the range of CAT I would be considered a CAT II operation). This does not apply if the RVR and/or DH has been approved as operational credits.

Note 2. — The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of

position, in relation to the desired flight path. In the case of a circling approach operation, the required visual reference is the runway environment.

2.9.3 Decision height

The Decision Height must not be lower than:

a) the minimum DH specified in the AFM, if stated

b) the minimum height to which the precision approach aid can be used without the required visual reference; and

c) the DH to which the flight crew is authorised to operate.

2.9.4 Visual reference/ RVR

a) For CAT III operations, the pilot may not be required to see the runway prior to touchdown. The permitted RVR is dependent on the level and availability of aircraft equipment.

b) A CAT III runway may be assumed to support operations with no DH unless specifically restricted as published in the AIP or NOTAM.

2.10 Certification for low visibility operations

2.10.1 An authorisation for Category II / III operations will not be granted, until the applicant has;

a) Demonstrated that the flight crew have carried out an approved programme of training as per Chapter 4 of this CAGM;

b) Laid down detailed procedures and instructions for crew in the operations manual for the operation of the aircraft in low visibility operations as per Chapter 4 of this CAGM;

c) Laid down detailed procedures and instructions for Pilot in Command and flight operations officers (if required as per the operator Operations Specifications) in respect of flight dispatch in low visibility operations as per the Chapter 4 of this CAGM;

d) Demonstrated that the aircraft and its equipment, maintenance programme including qualifications of maintenance staff meet requirements of Chapter 3 and chapter 5 of this CAGM.

e) The operator and personnel has completed satisfactorily all evaluations as required in this CAGM.

2.11 Interim Category II minima

2.11.1 When the above requirements have been met, pilots of the applying carrier who have successfully undergone an evaluation will be initially authorised for interim Category II minima.

2.11.2 Interim Category II minima will be a value between Category I minima and the lowest limit of Category II operations as per this CAGM.

2.11.3 Approval for the lowest limit of Category II minima will be subject to;

a) Accumulation of adequate operational experience by the operator in operating as per Interim Category II procedures as determined by the CAAM

b) Analysis of pilot reports of ground and airborne system performance with satisfactory results

c) Accumulation of adequate operational experience by flight crew in operating as per Interim Category II minima as determined by the CAAM

d) Accumulation of adequate operational experience by maintenance staff as per Interim Category II procedures as determined by the CAAM.

2.12 Interim Category III minima

2.12.1 Authorisation for Category III operations must precede adequate experience as a Category II operator. The adequate experience level will be determined by the CAAM on a case by case basis.

2.12.2 Interim Category III minima will be 30 feet Initially, approval for the lowest limit of Category III may only be authorised with accumulation of adequate operational experience.

3 Aeroplane and its Equipment

3.1 Acceptance of certification conducted by a contracting state

3.1.1 Authorisation granted by a contracting state (state of manufacture only) for an aircraft to conduct Category II and Category III operations is usually accepted by CAAM.

3.1.2 Certification as required in 3.1.1. above should comply with;

a) EASA document on certification specifications, including airworthiness codes and acceptable means of compliance, for all weather operations (« CS-AWO »), or

b) FAA AC 120-28D, Criteria for Approval of Category III Landing Weather Minima, or AC 120-29A, Criteria for Approving Category I and Category II Landing Minima.

3.1.3 CAAM usually adopts all procedures required by the contracting state, referred to in 3.1.2, for the conduct of Category II and Category III operations and maintenance procedures.

3.1.4 Category II and Category III approval should be found in the aircraft flight manual or any other equivalent documents accepted by the CAAM.

3.2 Certification by CAAM for low visibility operations

3.2.1 Any request for the initial certification of an aircraft to conduct Category II and Category III operations will be considered by the CAAM on a case-by-case basis.

3.2.2 CAAM conforms to the requirements in this CAGM and the recommendations in the ICAO Doc 9365 – Manual of All-Weather operations during all initial Certification of Category II and Category III operations.

3.2.3 The requirements to be met for the certification of Malaysian registered aeroplanes for Category II and III operations are specified in paragraph 3.1.2.

3.2.4 Where the certification required by paragraph 3.2.3 above does are not met, operator should provide an engineering report detailing compliance with the paragraph 3.1.2 above as applicable.

3.2.5 Aeroplanes not registered in Malaysia will be accepted for Category II and III operations provided that the certification by the State of Registry is based on paragraph 3.1.2.

3.3 Airborne Equipment

3.3.1 The following items of equipment will be required for operations to the decision altitude/heights specified unless it is shown that the intended level of safety is achieved with alternative equipment or the deletion of some items

3.3.1.1 Category II

(a) Autopilot with ILS coupling mode.

NOTE: A flight director system (head up or down) with an ILS coupling mode may be approved for use following failure or disconnect of the autopilot.

(b) Autothrust, unless it can be shown that speed control does not add excessively to the crew workload.

(c) Radio altimeter.

(d) Excess ILS deviation warnings.

3.3.1.2 Category IIIA

(a) Equipment required in 3.3.1.1 above.

(b) Autopilot with an automatic landing mode.

3.3.1.3 Category IIIB

(a) Equipment required in 3.3.1.1 (a) (c) and (d).

(b) Autothrust.

(c) Autopilot with a fail-operational automatic landing system and an automatic missed approach mode.

3.3.1.4 Category IIIC

(a) Equipment required in 3.3.1.1 (a) (c) and (d).

(b) Equipment required in 3.3.1.3 (b) and (c).

(c) Autopilot with a fail-operational ground roll mode.

(d) Anti-skid braking system, as required by the aircraft certification.

3.4 Minimum equipment list (MEL)

3.4.1 The operator should ensure that all instruments and equipment items related to the Category II and Category III are specified in the MEL.

3.4.2 The MEL should contain─

a) the list of each instrument and equipment required;

b) information concerning the aircraft equipment deficiencies relating to Category II and Category III capabilities; and

c) maintenance procedures to enable equipment or systems to be deactivated safely

4 Operations of the Aeroplane

4.1 Operating procedures

4.1.1 The operator shall establish procedures and instructions to be used for LVOs. These procedures and instructions shall be included in the operations manual or procedures manual and contain the duties of flight crew members during taxiing, take-off, approach, flare, landing, rollout and missed approach operations, as appropriate.

4.1.2 Prior to commencing an LVO, the Pilot-In-Command shall be satisfied that:

a) the status of the visual and non-visual facilities is sufficient;

b) appropriate LVPs are in force according to information received from air traffic services (ATS);

c) flight crew members are properly qualified.

4.1.3 Low visibility operations include:

a) manual take-off, with or without electronic guidance systems or HUDLS/hybrid HUD/HUDLS;

b) approach flown with the use of a HUDLS/hybrid HUD/HUDLS and/or EVS;

c) auto-coupled approach to below DH, with manual flare, hover, landing and rollout;

d) auto-coupled approach followed by auto-flare, hover, auto-landing and manual rollout; and

e) auto-coupled approach followed by auto-flare, hover, auto-landing and auto-rollout, when the applicable RVR is less than 400 m.

Note 1. – A hybrid system may be used with any of these modes of operations.

Note 2. – Other forms of guidance systems or displays may be certificated and approved.

4.2 Procedures and operating instructions

4.2.1 Standard operating procedures and instructions to be used for low visibility take-off, approaches utilising enhanced vision system (EVS) and Category II and III operations should be established. These procedures should be included in the Operations Manual and contain the duties of flight crew members during taxiing, take-off, approach, flare, landing, roll-out and missed approach as appropriate.

4.2.2 The precise nature and scope of procedures and instructions given depend upon the airborne equipment used and the flight deck procedures followed. An operator should clearly define flight crew member duties during taxi, take-off, approach, flare, roll-out and missed approach in the Operations Manual. Particular emphasis needs to be

placed on flight crew responsibilities during transition from non-visual conditions to visual conditions, and on the procedures to be used in deteriorating visibility or when failures occur. Special attention should be paid to the distribution of flight deck duties so as to ensure that the workload of the pilot making the decision to land or execute a missed approach enables him to devote himself to supervision and the decision-making process.

4.2.3 Operating procedures and instructions should be detailed in the Operations Manual. The instructions should be compatible with the limitations and mandatory procedures contained in the Aircraft Flight Manual and cover the following items in particular but not limited to:

a) Checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;

b) Effect on minima caused by changes in the status of the ground installations and airborne equipment;

c) Procedures for the taxi, take-off, approach, flare, landing, roll-out and missed approach;

d) Procedures to be followed in the event of failures, such as engines, electrical system, hydraulics and flight control system.

e) Procedures to be followed in the event of failures, warnings to include HUD/HUDLS/Hybrid HUDLS/EVS and other non-normal situations.

f) The minimum visual reference required;

g) The importance of correct seating and eye position;

h) Action which may be necessary arising from a deterioration of the visual reference;

i) Allocation of crew duties in the carrying out of the procedures according to (a) to (e) and (g) above, to allow the pilot in command/Commander to devote himself mainly to supervision and decision making;

j) The requirement for all height calls below (200 ft) to be based on the radio altimeter and for one pilot to continue to monitor the aircraft instruments until the landing is completed;

k) The requirement for the Localizer Sensitive Area to be protected;

l) The use of information relating to wind velocity, wind shear, turbulence, runway contamination and use of multiple RVR assessments;

m) Standard Operating Procedures to be used for:

1) Category II and III approaches
2) Approaches utilising EVS; and

3) Practice approaches and landing on runways at which the full Category II or Category III aerodrome procedures are not in force;

n) Operating limitations resulting from airworthiness certification; and

o) Information on the maximum deviation allowed from the ILS glide path and/or localizer.

4.2.4 The operations manual should specify:

a) conditions to be satisfied prior to conducting a LVTO, Category II / III approach, and suitable addition to the pre-takeoff / approach briefing.

b) the situations when a missed approach should be initiated during operations in Category II / III weather conditions.

c) actions to be taken in the event of engine failure. These instructions will, under such circumstances, forbid the commencement or continuation of an approach to Category II/III limits, unless an operator demonstrates to CAAM that exceptions to this general rule are justified for specific situations and aircraft types. If exceptions are approved, the operations manual will clearly describe the agreed situations under which a Category II/III approach may be conducted with one engine inoperative.

4.3 Flight Crew Training and Qualification

4.3.1 The operator shall ensure that, prior to conducting LVO:

a) each flight crew member:

1) complies with the training and checking requirements prescribed in the operations manual, including flight simulation training device (FSTD) training, in operating to the limiting values of RVR/VIS (visibility) and DH specific to the operation and the aircraft type;
2) is qualified in accordance with the standards prescribed in the operations manual;

b) the training and checking is conducted in accordance with a detailed syllabus.

4.3.2 Type and command experience

4.3.2.1 Before commencing CAT II operations, the following additional provisions should be applicable to pilots-in-command/commanders, or pilots to whom conduct of the flight may be delegated, who are new to the aircraft type or class:

a) 50 hours or 20 sectors on the type, including line flying under supervision; and

b) 100 meters should be added to the applicable Category II RVR minima when the operation requires a Category II manual landing or use of HUDLS to touchdown until:

1) a total of 100 hours or 40 sectors, including line flying under supervision, has been achieved on the type; or

2) a total of 50 hours or 20 sectors, including line flying under supervision, has been achieved on the type where the flight crew member has been previously qualified for CAT II manual landing operations with an operator acceptable to the CAAM.

3) For HUDLS operations the sector requirements in 4.3.2.1 and 4.3.2.2 a)should always be applicable, the hours on type/class does not fulfil the requirement

4.3.2.2 Before commencing Category III operations, the following additional requirements are applicable to pilots-in-command/commanders, or pilots to whom conduct of the flight may be delegated, who are new to the aircraft type:

a) 50 hours or 20 sectors on the type, including line flying under supervision; and

b) 100 m should be added to the applicable CAT II or CAT III RVR minima unless he has previously qualified for CAT II or III operations with an operator acceptable to the CAAM, until a total of 100 hours or 40 sectors, including line flying under supervision, has been achieved on the type.

4.3.2.3 The CAAM may approve a reduction in the above command experience requirements for flight crew members who have Category II or Category III pilot in command experience if such experiences are acceptable to the CAAM.

4.3.2.4 There are no additional requirements for first officer and flight engineer (if applicable) other than the requirement prescribed in 4.3.1, before commencing Category II / III operations.

4.3.3 Crew training - flight crew members with no previous Category II or Category III experience

4.3.3.1 Flight crew members with no previous Category II or Category III experience should complete at least the following training programme.

4.3.3.2 Ground training.

4.3.3.2.1 An initial ground training course for low visibility operations should cover at least:

a) The characteristics and limitations of the ILS, including the effect on aircraft systems performance of interference to the ILS signal caused by other landing, takeoff or overflying aircrafts and the effect of the infringement of ILS critical and sensitive areas by aircrafts or vehicles in the maneuvering area.

b) The characteristics of the visual aids (e.g.; approach lighting, touchdown zone lighting, centre line lighting) and the limitations on their use as visual cues in reduced RVRs with various glide path angles and cockpit cut of angles and the heights at which various cues may be expected to become visible in actual operations.

c) The operation, capabilities and limitations of the airborne systems(e.g.; the automatic fight control systems, monitoring and warning devices, flight instruments – including altimetry system, the means the pilot has to assess the position of the aircraft during the approach, touchdown and roll out),and to include HUD symbology and EVS characteristics if appropriate;

d) Approach, including missed approach procedures and techniques including description of the factors affecting height loss during missed approach in normal and abnormal aircraft configurations.

e) The use and limitation of RVR, including the applicability of RVR readings from different positions of the runway, the different methods of measuring and assessing RVR, and the limitations associated with each method.

f) The basic understanding of obstacle limitation and the obstacle free zone, including missed approach design criteria and of obstacle clearance for Category II and III operations.

g) The effects of precipitation, ice accretion, low level windshear, turbulence and characteristic of fog;

h) The pilot task at decision height, procedures and techniques for transition from instrument to visual fight in low RVR conditions, including the geometry of eye, wheel and antenna positions with reference to ILS reference datum height.

i) Action to be taken if the visual reference becomes inadequate when the aircraft is below the 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.

j) Action to be taken in the event of failure of approach and landing equipment above and below decision height.

k) Recognition of and action to be taken in the event of failure of ground equipment.

l) Significant factors in the determination of decision height, the effect of terrain profile in the approach area on radio altimeter readings and on the automatic approach/landing systems;

m) The importance and significance of alert height if applicable and the action in the event of any failure above and below the alert height;

n) Effect of specific aircraft malfunctions (e.g.; engine failure) on auto throttle, auto pilot performance etc;

o) Procedures and precautions to be followed while taxying during low visibility operations.

p) Additional procedures required for take-off in conditions of RVR less than 150 m. (200 m. for Category D aircrafts);

q) The importance of correct seating and eye position.

r) The qualification requirements for pilots to obtain and retain approval to conduct low visibility take-offs and Category II or III operations;

s) Knowledge of operator on AOC / Operations specifications and contents of CAAM approved manual for low visibility operations.

4.3.3.2.2 All flight crew members should understand their duties and responsibilities and the need for close crew coordination.

4.3.3.3 FSTD training

4.3.3.3.1 FSTD training for low visibility operations should include:

a) Checks of satisfactory functioning of equipment required for low visibility operations, both on the ground and in flight;

b) Effect on minima caused by changes in the status of ground installations;

c) Monitoring of:

1) Automatic flight control systems and auto land status annunciators with emphasis on the action to be taken in the event of failures of such systems; and

2) HUD/HUDLS/EVS guidance status and annunciators as appropriate, to include head down displays;

d) Actions to be taken in the event of failures such as engines, electrical systems, hydraulics or flight control systems;

e) The effect of known unserviceability and use of minimum equipment lists;

f) Operating limitations resulting from airworthiness certification;

g) Guidance on the visual cues required at decision height together with information on maximum deviation allowed from glide path or localizer; and

h) The importance and significance of alert height if applicable, and the action in the event of any failure above and below the alert height.

4.3.3.3.2 FSTD training should be divided into phases covering;

a) Normal operation with no aircraft or equipment failures but including all weather conditions which may be encountered.

b) Detailed scenarios of aircraft and equipment failures, which could affect Category II or III operations.

c) If the aircraft system involves the use of hybrid or other special systems (such as HUD/HUDLS or enhanced vision equipment), flight crew members should practice the use of these systems in normal and abnormal modes during the FSTD phase of training.

d) Incapacitation procedures appropriate to low visibility take-offs and Category II and III operations

4.3.3.4 Initial Category II and III training should include at least the following exercises:

a) Approach using the appropriate flight guidance, autopilots and control systems installed in the aircraft, to the appropriate decision height and to include transition to visual flight and landing;

b) Approach with all engines operating using the appropriate flight guidance systems, autopilots, HUDLS and/or EVS and control systems installed in the aircraft down to the appropriate decision height followed by missed approach; all without external visual reference;

c) Where appropriate, approaches utilising automatic flight systems to provide automatic flare, landing and rollout;

d) Normal operation of the applicable system both with and without acquisition of visual cues at decision height.

4.3.3.5 Emergency / Abnormal phases of simulator training should include at least:

a) Approaches with engine failure at various stages on the approach;

b) Approaches with critical equipment failures (e.g. electrical systems, auto flight systems, ground and/or airborne ILS/MLS systems and status monitors);

c) Approaches where failures of auto flight equipment and/or HUD/HUDLS/Hybrid HUDLS/EVS at low level require either;

d) Reversion to manual flight or a downgraded automatic mode to control missed approaches from, below decision height including those which may result in a touchdown on the runway, such as to simulate failures or a loss of visual reference prior to touch down;

e) Failures of the systems which will result in excessive localizer and/or glide slope deviation, both above and below decision height, in the minimum visual conditions authorised for the operation. In addition, a continuation to

a manual landing should be practiced if a head-up display forms a downgraded mode of the automatic system or the head-up display forms the only flare mode; and

f) Failures and procedures specific to aircraft type or variant.

4.3.3.6 The training programme should provide practice in handling faults which require a reversion to higher minima.

4.3.3.7 The training programme should include the handling of the aircraft when, during a fail passive Category III approach, the fault causes the autopilot to disconnect at or below decision height when the last reported RVR is 300 m or less.

4.3.3.8 In addition to the requirements of crew training in CAD 6, Prior to conducting take-offs in RVRs below 400 m, training should be established to cover systems failures and engine failure resulting in continued as well as rejected take-offs.

4.3.3.9 The training programme should include, where appropriate, approaches where failures of the HUD/HUDLS/Hybrid HUDLS and/or EVS equipment at low level require either:

g) Reversion to head down displays to control missed approach; or

h) Reversion to flight with no, or downgraded, HUDLS Guidance to control missed approaches from decision height or below, including those which may result in a touchdown on the runway.

4.3.3.10 When undertaking low visibility take-off and Category II and III Operations utilising a HUD/HUDLS or hybrid HUD/HUDLS or an EVS, that training programme should include, where appropriate, the use of the HUD/HUDLS in normal operations during all phases of flight.

4.3.4 Crew training - flight crew members with previous Category II or Category III experience

4.3.4.1 Flight crew members with previous Category II or Category III experience with a similar type of operation (auto coupled /auto-land, HUDLS/Hybrid HUDLS or EVS) or Category II with manual land if appropriate with another operator acceptable to the CAAM may undertake an abbreviated ground / flight training programme.

4.4 Flight crew certification

4.4.1 For the purpose of a Category II or Category III Check, a successful approach is defined as one in which, at the DH:

a) The aircraft is in trim for continuation of a normal approach and landing;

b) The aircraft is positioned so that the flight deck is within, and tracking to remain within, the lateral confines of the runway extended;

c) Deviation from the glide path does not exceed ±75 microamperes (equivalent to one dot) * as displayed on the ILS indicator; no unusual roughness or excessive attitude changes have occurred after leaving the middle marker.

d) This relationship may not be true for older instruments. In such cases, the allowable indicators deflection is that which is equivalent to ±75 microamperes.

4.4.2 When preparatory requirements have been met, arrangements will be made between the Air Operator and CAAM, for crew evaluation. Details of the evaluation procedure will be determined by the Operator, and the following general criteria should apply;

a) An evaluation of flight crews and operating procedures for certification for Category II or III will be demonstrated using applicable type simulators certified for Category II or III by CAAM.

b) Non-visual simulators may be used to demonstrate crew coordination and proficiency in the handling of emergency procedures during an approach and overshoot. All other Checks, whether initial or recurrent, should be done in a visual type simulator.

c) The crew should consist of a Pilot-In-Command, a first officer, and a third crewman as appropriate to type.

d) The Operator should try to introduce a fault prior to the Category II or III Approach to permit observation of the crew's ability to assess the approach capability of the aircraft.

4.4.3 The Captain's initial or recurrent Category II or III Proficiency Check will at least comprise of:

a) One Category II or III ILS approach, during which a practical emergency (e.g. engine fire) is introduced, aimed at assessing crew co-ordination.

b) One Category II or III ILS approach to a landing in Category II or III weather minima. (An automatic landing or manual landing from an approved manual system).

c) A missed approach starting from a very low altitude which may result in touchdown during the go-around manoeuvres.

d) For those Category II or III operations predicated on the use of a fail- passive rollout control system, a manual rollout using visual reference or a combination of visual and instrument references.

4.4.4 Other flight crew members will be Checked concurrently in the performance of their assigned duties in support of the above initial/recurrent Proficiency Check items.

4.4.5 The recording of the evaluation should be made on the pilot proficiency check report. The authorised DH/ RVR annotated in the appropriate area in the report.

4.4.6 The period of certification will be for six months or up to the validity period of the PPC. Recurrent checks may be combined with Pilot Proficiency Check or during an approved LOFT programme.

4.4.7 If HUDLS and / or EVS is utilised to touchdown, 4 approaches are required.

4.5 Certification of Low Visibility Take Off (LVTO)

4.5.1 The checks required in 4.11 of CAD 6 may be combined with crew certification for Category II or III operations.

4.5.2 The recording of the evaluation should be made on the pilot proficiency check report, with the authorised RVR annotated in the appropriate area in the report.

4.5.3 Approved take-off minima for commercial air transport aeroplanes:

FACILITIES	RVR/VIS
Adequate visual reference (day only)[2]	500 m/1 600 ft
Runway edge lights or runway centre line markings[3]	400 m/1 200 ft
Runway edge lights and runway centre line markings[3]	300 m/1 000 ft
Runway edge lights and runway centre line lights	200 m/600 ft
Runway edge lights and runway centre line lights and relevant RVR information[4]	TDZ 150 m/500 ft MID 150 m/500 ft Stop-end 150m
High intensity runway edge lights and runway centre line lights (spacing 15 m or less) and relevant RVR information[4]	TDZ 125 m/400 ft MID 125 m/400 ft Stop-end 125
High intensity runway edge lights and runway centre line lights (spacing 15 m or less), approved lateral guidance system and relevant RVR information[4]	TDZ 75 m/300 ft MID 75 m/300 ft Stop-end 75 m/300

[1] The TDZ RVR/VIS may be assessed by the pilot.

[2] Adequate visual reference means that a pilot is able to continuously identify the take-off surface and maintain directional control.

[3] For night operations at least runway edge lights or centre line lights and runway end lights are available.

[4] The required RVR is achieved for all relevant RVRs.

4.6 Flight crew recency requirements

To maintain LVO currency, recurrent checks are required as per 4.11 of CAD 6 may be combined with pilot proficiency checks, as required by CAD 6. However, as a minimum, at least three LVO approaches should be conducted in an aircraft / FSTD in concurrent with the PPC checks to ensure flight crew continuous familiarity with the associated procedures.

4.7 Performance reliability system

4.7.1 Following certification to conduct low visibility operations, the air operator should use the airborne system to approved minima as frequently as feasible to ensure continued performance and reliability of the system and to build up pilot experience in approaches to authorised limits.

4.7.2 Each Category II/III approach, real or simulated, is to be recorded on a form developed by the operator, including the following information as a minimum:

a) Date, type of aircraft, name of Pilot-In-Command, aerodrome and runway of landing, and reported ceiling and visibility;

b) Whether approach was auto-coupled or flown manually;

c) If auto-coupled, indicate, when applicable:

1) If flight director agreed with autopilot,
2) The height at which coupler was disengaged,
3) If auto landing was successful;

d) Whether the approach was successful, as defined in 4.4, or unsuccessful;

e) If the approach was unsuccessful, specify the unsatisfactory element of the Category II/III system (e.g. airborne equipment, ground installation, crew performance, traffic condition);

f) The difference, if any, between computed airspeed and actual airspeed at the DH;

g) An assessment of the overall quality of the Category II/III system as Good, Acceptable, Poor or unacceptable.

4.7.3 A consolidated report containing the required information in 4.7 is to be sent to CAAM monthly. These reports will be used as one basis for determining when an operator may be considered for upgrading to operational Category II/III minima.

4.8 Practice approaches

4.8.1 Operators who wish to perform automatic landings in Category I or better weather conditions for training purposes, or record data for operational demonstrations should have appropriate procedures for the guidance of flight crew included in the operations manual.

4.9 LVO approaches in foreign aerodromes

4.9.1 Malaysian registered aircraft shall not conduct Low Visibility Operations in foreign aerodromes unless the following conditions are met:

a) The Air Operator is authorised by CAAM to conduct Category II / III Operations in their Air Operator Certificate using the type of aircraft requested; and

b) The Air operator has obtained the approval from the Civil Aviation regulatory authority of the State of the aerodrome to conduct Category II and III operations at the requested Aerodrome if such approval is required.

5 Airworthiness and Maintenance Considerations

5.1 Continuing airworthiness maintenance programme

5.1.1 Unless otherwise approved by CAAM, each operator should have an approved continuing airworthiness maintenance programme.

5.1.2 The approved continuing airworthiness maintenance programme should include any necessary provisions to address lower landing minima (LLM) or low visibility takeoff in accordance with the operator intended operation and the:

a) manufacturers recommended maintenance program;

b) MRB requirements or equivalent requirements; or

c) any subsequent Manufacturer, State of Design or CAAM designated requirements (e.g., Ads, mandatory service bulletins).

5.1.3 Emphasis should be on maintaining and ensuring total system performance, accuracy, availability, reliability, and integrity for the intended operations.

5.2 Continuing airworthiness maintenance program provisions

5.2.1 The maintenance programme should be compatible with operator organisation and ability to implement and supervise the program.

5.2.2 Maintenance personnel should be familiar with─

a) the operator approved programme;

b) their individual responsibilities in accomplishing that programme; and

c) the availability of any resources within or outside of the maintenance organisation that maybe necessary to assure programme effectiveness

5.2.3 Provision for low visibility operations may be addressed as specific program or may be integrated with general maintenance programme.

5.2.4 Regardless whether the maintenance program is integrated or is designated as a specific program for Lower Landing Minima (LLM), the maintenance programme should address the following─

a) maintenance procedures necessary to ensure continuing airworthiness relative to low visibility operations;

b) a procedure to revise and update the maintenance programme;

c) a method to identify, record or designate personnel currently assigned responsibility in managing the programme, performing the programme, maintaining the programme, or performing quality assurance for the programme;

d) this includes identification of any service provider or sub-contractor organisation, or where applicable, their personnel;

e) verification should be made of the lower landing minima status and configuration status for each aircraft brought into the maintenance or lower minimum programme. Unless otherwise accepted by CAAM, each aircraft should meet relevant criteria specified by the applicable aircraft manufacturer or avionics manufacturer for associated systems and equipment (e.g., valid certifying authority's TC, appropriate STC records and compliance, assessment of status of any engineering orders, AD's service bulletins or other compliance);

f) identification of modifications, additions, and changes which were made to qualify aircraft systems for the intended operation or minima, if other than as specified in the AFM, TC or STC validated or accepted by the CAAM;

g) identification of additional maintenance requirements and log entries necessary to change minima status;

h) any discrepancy reporting procedures that may be unique to the low visibility programme. If applicable, such procedures should be compatibly described in maintenance documents and operations documents;

i) procedures that identify, monitor and report lower minimum system and component discrepancies for the purpose of quality control analysis;

j) procedures that define, monitor, and report chronic and repetitive discrepancies;

k) procedure that ensure aircraft remain out of lower minima status until successful corrective action has been verifies for chronic and repetitive discrepancies;

l) procedures that ensure the aircraft system status is placard properly and clearly documented in the aircraft logbook, in coordination with maintenance control, engineering, flight operations, and dispatch, or equivalent;

m) procedures to ensure the downgrade of an aircraft low visibility capability status, if applicable, when maintenance has been performed by persons other than those trained, qualified, or authorised to use or approve procedures related to low visibility operations;

n) procedures for periodic maintenance of systems ground check and systems flight checks, as applicable. For example, following a heavy maintenance, suitable checks may need to be performed prior to maintenance release;

o) provisions for an aircraft to remain in a specific low visibility capability status (e.g., CAT II, CAT III, Fail-Operational, Fail-Passive) or other designated operational status used by the operator; and

p) provision should be made for periodic operational sampling of suitable performance, which are:

1) at least one satisfactory approach should have been accomplished within a specified period approved for that operator, unless a satisfactory systems ground check has been accomplished;
2) a recording procedure for both satisfactory and unsatisfactory results shall be included;
3) fleet sampling is not typically acceptable in lieu of specific aircraft assessment;
4) at least one satisfactory low visibility system operational use, or a satisfactory systems ground check, should be accomplished within 6 months for an aircraft to remain in CAT II status and for CAT III systems, at least one satisfactory low visibility system operational use or a systems ground check, should be accomplished within 30 days for an aircraft to remain in Category III status;
5) any extension to an aircraft sampling period should be based on the demonstrated reliability of that operator aircraft flight guidance system (FGS) performance in service; and
6) failure of an operator to maintain an acceptable reliability record should result in timely and appropriate remedial action, and this could lead to reconsideration of suitability of any sampling period extensions or fleet statistical sampling authorisations.

5.3 Initial and recurrent maintenance training

5.3.1 Operator and contract maintenance personnel should receive initial and recurrent training as necessary for an effective programme including─

a) licence aircraft engineers;

b) maintenance controllers;

c) avionics technicians

d) personnel performing maintenance inspection or quality assurance; and

e) other engineering personnel (AMO & CAMO personnel) if applicable.

5.3.2 The training curriculum should include specific aircraft systems and operator policies and procedures applicable to low visibility operations.

5.3.3 Recurrent training should be accomplished—

a) at least annually; and

b) when a person has not been involved in the maintenance of the specified aircraft or systems for an extended period of more than 6 months.

5.3.4 The training should at least include, as applicable—

a) an initial and recurrent training programme for appropriate operator and contract personnel;

b) personnel considered to be included are maintenance personnel, quality and reliability groups, maintenance control, and incoming inspection and stores, or equivalent organisations.

c) training should include both classroom and at least some “hands-on” aircraft training for those personnel who are assigned aircraft maintenance duties. Otherwise, training may be performed—

1) in a classroom;
2) by computer based training;
3) in simulators;
4) in an airplane or in any other effective combination of the above; or
5) consistent with the approved programme, and considered acceptable to CAAM

5.3.5 Subject areas for training should include—

a) operational concepts;

b) aircraft types and systems affected;

c) aircraft variants and differences where applicable;

d) procedures to be used;

e) manual or technical reference availability and use;

f) processes, tools or test equipment to be used;

g) quality control;

h) methods for testing and maintenance release;

i) sign-offs required;

j) proper Minimum Equipment List (MEL) application;

k) general information about where to get technical assistance as necessary;

l) necessary coordination with other parts of the operator organisation (e.g., flight operations, dispatch); and

m) any other maintenance program requirements unique to the operator or the aircraft types or variants flown. (e.g., human factors considerations, problem reporting)

5.3.6 Procedures for the use of outside vendors or vendor’s parts that ensures compatibility to programme requirements and for establishing measures to control and account for parts overall quality assurances.

5.3.7 Procedures to ensure tracking and control of components that are “swapped” between systems for trouble shooting when systems discrepancies cannot be duplicated.

5.3.8 Procedures to assess, track and control the accomplishment of changes to components or systems pertinent to low visibility operations.

5.3.9 Procedures to record and report lower minimum operation(s) that are discontinued/ interrupted because of system(s) malfunction.

5.3.10 Procedures to install, evaluate, control, and test system and component software changes, updates, or periodic updates.

5.3.11 Procedures related to the MEL remarks section use which identify low visibility related systems and components, specifying limitations, upgrading and downgrading.

5.3.12 Procedures for identifying low visibility related components and systems as required inspection item, to provide quality assurance whether performed in-house or by contract vendors.

5.4 Test equipment/calibration standards

5.4.1 The test equipment may require periodic re-evaluation to ensure it has the required accuracy and reliability to return systems and components to service following maintenance.

5.4.2 A listing of primary and secondary standards used to maintain test equipment which relate to low visibility operations should be maintained.

5.4.3 It is operator responsibility to ensure these standards are adhered by the contract maintenance organisations. Traceability to a national standard or the manufacturer's calibration standards should be maintained.

5.5 Maintenance release procedures

5.5.1 Procedures should be included to upgrade or downgrade systems status concerning low visibility operations capability.

5.5.2 The method for controlling operational status of the aircraft should ensure that flight crews, maintenance and inspection departments, dispatch, and other administrative personnel as necessary are appropriately aware of aircraft and system status.

5.5.3 The appropriate level of testing should be specified for each component or system.

5.5.4 The manufacturer recommended maintenance programme or maintenance instructions should be considered when determining the role built-in-test equipment (BITE) should play for return to service procedures or for use as a method for low visibility status upgrade or downgrade.

5.5.5 Contract maintenance facilities or personnel should follow the operator's CAAM approved maintenance programme to approve an aircraft for maintenance release.

5.5.6 The operator is responsible for ensuring that contract maintenance organisation and personnel are appropriately trained, qualified and authorised.

5.6 Periodic aircraft system evaluations

5.6.1 The operator should provide a method to continuously assess or periodically evaluate aircraft system performance to ensure satisfactory operation for those systems applicable to Category II or Category III.

5.6.2 An acceptable method for assuring satisfactory performance of a low visibility flight guidance system (e.g., autoland or HUD) is to periodically use the system and note satisfactory performance.

5.6.3 A reliable record such as a logbook entry or computer ACARS record showing satisfactory performance within the previous 6 months for Category II, or previous Category III, is typically an acceptable method for assuring satisfactory systems operations. (see 5.2.4 (p)).

5.6.4 Periodic flight guidance system/autoland system checks should be conducted in accordance with—

a) procedures recommended by the airframe or avionics manufacturer; or

b) by an alternate procedure approved by the Authority.

5.6.5 For periodic assessment, a record should be established to show—

a) when and where the flight guidance/autoland system was satisfactorily used; and

b) if performance was not satisfactory, to describe any remedial action taken.

5.6.6 Use of the flight guidance/automatic landing system should be encouraged to assist in maintaining its availability and reliability.

5.7 Reliability reporting and quality control

5.7.1 For a period of 1 year after an operator has been authorised reduced minima, a monthly summary should be submitted to the CAAM.

5.7.2 The following information should be reported—

a) the total number of approaches tracked;

b) the number of satisfactory approached tracked, by aircraft/system type and visibility (RVR), if known or recorded;

c) the total number of unsatisfactory approaches;

d) with reasons for unsatisfactory performance, if known, listed by appropriate category (e.g., poor system performance, aircraft equipment problem/failure; ground facility problem, ATC instruction, lack of critical area protection, or other); and

e) the total number of unscheduled removals of components of the related avionics systems.

5.7.3 Reporting after the initial period should be in accordance with the operator established reliability and reporting requirements accepted by the Authority.

5.8 Configuration control/system modification

5.8.1 The operator should ensure that any modification to systems and components approved for low visibility operations are not adversely affected when incorporating software changes, service bulletins, hardware additions or modifications.

5.8.2 Any changes to system components should be consistent with the aircraft manufacturer's, avionics manufacturer's, industry or CAAM accepted criteria and processes.

5.9 Records

5.9.1 The operator should keep suitable records (e.g., both the operator's own records and access to records of any applicable contract maintenance organisation).

5.9.2 This is to ensure that both the operator and CAAM can determine the appropriate airworthiness configuration and status of each aircraft intended for Category II and III operations.

5.9.3 Contract maintenance organisations should have appropriate records and instructions for coordination of records with the operator.

INTENTIONALLY LEFT BLANK

6 THE AERODROME

6.1 *RESERVED*

INTENTIONALLY LEFT BLANK

7 Attachments

7.1 Attachment A: LVO application form

7.1.1 The Latest Application form (CAAM/BOP/SPA/LVO) may be obtained from the CAAM Website. https://www.caam.gov.my/e-services-forms/air-operations/