GUIDANCE AND INFORMATION ON APPLYING FOR AN EXEMPTION TO USE AN ENHANCED VISION SYSTEM/HEAD UP DISPLAY (EVS/HUD) TO DESCEND BELOW DH/MDH
REVISION HISTORY

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Guidance reviewed against ICAO Doc 9365 Manual of All-Weather Operations, resulting in:

Inclusion of definitions and philosophy of Operational Credit, and

Change to the visual reference requirements.
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1 Introduction

An enhanced vision system (EVS) is an electronic means to overlay an image of the forward surrounding topography on a head up display (HUD), allowing the pilot to see the surrounding terrain in low visibility conditions. Using an EVS, an aircraft may descend to 100 feet above the runway threshold elevation, based on the operational requirements outlined below and with an exemption from the Isle of Man Aircraft Registry. An exemption can only be granted for infrared systems that utilise a HUD as part of the EVS equipment. The infrared EVS performance can vary depending on the weather conditions encountered.

1.1 Definitions

Aerodrome Operating Minima. The limits of usability of an aerodrome for:

(a) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;

(b) landing in two-dimensional (2D) instrument approach operations, expressed in terms of visibility and/or runway visual range minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions; and

(c) landing in three-dimensional (3D) instrument approach operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the type and/or category of the operation.

All-Weather Operations. Any surface movement, take-off, departure, approach or landing operations in conditions where visual reference is limited by weather conditions.

Combined Vision System. A system to display images from a combination of an enhanced vision system (EVS) and a synthetic vision system (SVS).

Converted Meteorological Visibility (CMV). A value (equivalent to an RVR) which is derived from the reported meteorological visibility.

Decision Altitude (DA) or Decision Height (DH). A specified altitude or height in a 3D instrument approach operation 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 (MSL) and decision height (DH) is referenced to the threshold elevation or touchdown zone elevation as appropriate for the State of the Aerodrome.

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.

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

Enhanced Flight Vision System (EFVS). A term used by some States to identify an EVS system to display electronic real-time images of the actual external scene achieved through the use of image sensors.

Enhanced Vision System (EVS). A system to display electronic real-time images of the actual external scene achieved through the use of image sensors.

Note.— EVS does not include night vision imaging system (NVIS).
**Final Approach.** That part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified:

(a) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or

(b) at the point of interception of the last track specified in the approach procedure, and ends at a point in the vicinity of an aerodrome from which:

1) a landing can be made; or

2) a missed approach procedure is initiated.

**Final Approach Segment.** That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.

**Flight Visibility.** The visibility forward from the cockpit of an aircraft in flight.

**Head-Up Display (HUD).** A display system that presents flight information into the pilot’s forward external field of view.

**Head-Up Display Approach and Landing Guidance System (HUDLS).** 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.

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

1.2 **Reference Document**


1.3 **Operational Credit**

Operational credit means lowering of the aerodrome operating minima or satisfying the flight visibility requirements or requiring fewer ground facilities when compensated by airborne capabilities. An example of operational credit is satisfying the flight visibility requirement for an instrument approach procedure through the use of a certified EVS. The reported natural vision might be less than prescribed for the procedure but the enhanced flight visibility as determined by the pilot is sufficient to land.

2 **Application Process**

Operators wishing to use a certified EVS/HUD to descend below minima shall apply for an Exemption from the Isle of Man Aircraft Registry.

2.1 **Application Form**

*Form 44 – Application to use EVS/HUD to Descend below Minima*, must be completed by the Operator or Flight Operations Representative (FOR) as recorded on the current Form 20.
2.2 Supporting Documentation

The IOMAR requires the following supporting documentation to be submitted along with the completed Application Form:

- AFM or AFM Supplement showing evidence of EVS/HUD certification.
- Relevant extracts from the EVS/HUD Operations Manual.
- EVS/HUD Training Records – for 2 validated pilots.

3 Operational Requirements

3.1 Certification

The EVS must be certificated and used in accordance with the procedures and limitations of the Aircraft Flight Manual and shall include:

(a) A head up display system capable of displaying airspeed, vertical speed, aircraft attitude, heading, altitude, command guidance as appropriate for the approach to be flown, path deviation indications, flight path vector, flight path angle reference cue and the EVS imagery;

(b) For two pilot operation a head-down view of the EVS image or other means of displaying EVS-derived information easily to the pilot monitoring the approach;

(c) If the aircraft is equipped with a radio altimeter, it will be used only as enhanced terrain awareness during approach using EVS and will not be taken into account for the operational procedures development.

3.2 Approach Permitted Using EVS

Use of EVS HUD to obtain operational credit and to descend below DH can be permitted on the following types of approaches:

- ILS, MLS, PAR, GLA or SBAS CAT I Approach with a DH no lower than 200 ft; and
- Approaches flown using approved vertical flight path guidance to an MDH or DH no lower than 250 ft.

All approaches shall be flown as stabilised approaches and all non-precision approaches shall be flown using the continuous descent final approach technique.

3.3 Operations Utilising EVS

An aircraft, using an appropriate certified EVS in accordance with the procedure and limitation of the approval flight manual may:

(a) continue an approach below DH or MDH to 100 ft above the threshold elevation of the runway provided that at least one of the following visual references is displayed and identifiable on the EVS:

1) elements of the approach lighting; or
2) the runway threshold, identified by at least one of the following:
   i). the beginning of the runway landing surface,
   ii). the threshold lights,
   iii). the threshold identification lights;
and, the touchdown zone, identified by at least one of the following:

i). the runway touchdown zone landing surface,

ii). the touchdown zone lights, or

iii). the touchdown zone markings or the runway lights.

(b) reduce the calculated RVR for the approach from the value in column 1 to the value in column 2 in the table in 3.5 Operational RVR Credit for an Approach Using EVS.

### 3.4 Visual References For Descent Below 100 Feet Above Runway Threshold Elevation

An approach may not continue below 100 feet above runway threshold elevation for the intended runway, unless at least one of the visual references specified below is distinctly visible and identifiable to the pilot without reliance on the enhanced vision system:

(a) the lights or markings of the threshold; or

(b) the lights or markings of the touchdown zone.
3.5 Operational RVR Credit for an Approach Using EVS

*Note: For operations in RVRs below 550 metres, two pilot operation is required.*

<table>
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<tr>
<th>Column 1</th>
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3.6 Aircraft Performance

Operators shall take into account any aircraft performance limitations associated with descent below DH or MDH e.g. missed approach procedures and terrain avoidance.

3.7 Crew Training

Initial and recurrent training shall be provided to pilots in the use of EVS to descend below DH or MDH.

The training shall reflect the complexity of the aircraft and the previous experience of the pilots but shall include aircraft system failures, engine failures, EVS failures and reversion to higher minima.

A sufficient number of approaches shall be flown to assure a safe level of operation.

Initial training shall include some element of line flying under supervision in the use of EVS to descend below DH or MDH.

The flight crew training manual shall contain the syllabus for use of EVS in initial and recurrent training.

3.8 Operations Manual

The Operations Manual shall contain all necessary instructions for the use of EVS in descent below DH or MDH.

3.9 Ongoing Compliance Monitoring

A record must be made following each low visibility approach and landing by the pilot-in-command and provided to the operator for compliance monitoring and any remedial action if required whenever the EVS is used in descent below DH or MDH and for providing feedback in order to enhance the safety performance.

Unsuccessful approaches due to aircraft equipment failures must be reported to the operator immediately for remedial action.

The operator must collect and analyse the low visibility approach and landing records. Results of the analysis will be required by the Isle of Man Aircraft Registry as part of the EVS/HUD Exemption renewal application process.

Notes:

RP44 Appendix A – Monitoring Record Form provides an example of an All Weather Operations (AWOPS) monitoring form.

RP44 Appendix B – Monitoring Record Analysis Spreadsheet provides a tool for the analysis of AWOPS approach and landing records. The summary tab on the spreadsheet can be submitted to the Isle of Man Aircraft Registry as part of the exemption renewal application process.

To request copies of RP44 Appendix A and B, please email flightoperations@gov.im

3.10 Planning

Not all aerodromes will be suitable for the use of EVS. Runway lights using light emitting diodes do not give off an infra-red signature. The operator shall identify the hazards associated with EVS operation at each intended aerodrome of use and allow or prohibit EVS in descent below DH or MDH accordingly.