Schedule 1

Includes the Acceptable Means of Compliance (AMC) and Guidance Material (GM) documents referenced below.

The text of the amendment is arranged to show deleted text, new or amended text as shown below:

(a) ~~Text to be deleted is shown struck through~~;

(b) New text is highlighted in grey;

(c) ~~Text to be deleted is shown struck through~~ followed by the replacement text which is highlighted in grey.

Annex I - Definitions

Annex I is amended as follows:

Point (aa) of GM1 Annex I Definitions is deleted

GM1 Annex I Definitions

DEFINITIONS FOR TERMS USED IN ACCEPTABLE MEANS OF COMPLIANCE AND GUIDANCE MATERIAL

(…)

~~(aa) 'Space-based augmentation system (SBAS)' means a wide coverage augmentation system that augments and/or integrates the information obtained from the other GNSS elements with information from a satellite-based transmitter. The most common form of SBAS in Europe is the European Geostationary Navigation Overlay Service (EGNOS).~~

GM2 is replaced by the following:

GM2 Annex I Definitions for terms used in Annex II to VIII

ABBREVIATIONS ~~AND ACRONYMS~~

The following abbreviations ~~and acronyms~~ are used in the Annexes to this Regulation:

2D	two-dimensional
3D	three-dimensional
A	aeroplane
a/c	aircraft
AAC	aeronautical administrative communications
AAIM	aircraft autonomous integrity monitoring
AAL	above aerodrome level
ABAS	aircraft-based augmentation system
AC	advisory circular
AC	alternating current
ACAS	airborne collision avoidance system
ADF	automatic direction finder
ADG	air driven generator
ADS	automatic dependent surveillance
ADS-B	automatic dependent surveillance - broadcast
ADS-C	automatic dependent surveillance - contract
AEA	Association of European Airlines

AEO	all-engines-operative
AFFF	aqueous film forming foams
AFM	aircraft flight manual
AFN	aircraft flight notification
AFN	ATS facilities notification
AGL	above ground level
AHRS	attitude heading reference system
AIREP	air-report
AIS	aeronautical information service
ALAP	aerodrome landing analysis programme
ALARP	as low as reasonably practicable
ALD	actual landing distance
ALSF	approach lighting system with sequenced flashing lights
AMC	Acceptable Means of Compliance
AML	aircraft maintenance licence
AMSL	above mean sea level
ANP	actual navigation performance
AOC	aeronautical operational control
AOC	air operator certificate
APCH	approach
APP	approach
APU	auxiliary power unit
APV	approach procedure with vertical guidance
AR	authorisation required
ARA	airborne radar approach
ARA	Authority Requirements for Aircrew
A-RNP	advanced required navigation performance
ARO	Authority Requirements for Air Operations
ARP	Aerospace Recommended Practices
ASC	Air Safety Committee
ASDA	accelerate-stop distance available
ASE	altimeter system error
ATA	Air Transport Association
ATC	air traffic control
ATIS	automatic terminal information service
ATN	air traffic navigation
ATPL	airline transport pilot licence
ATQP	alternative training and qualification programme
ATS	air traffic services
ATSC	air traffic service communication
AVGAS	aviation gasoline
AVTAG	aviation turbine gasoline (wide-cut fuel)
AWO	all weather operations
BALS	basic approach lighting system
Baro VNAV	barometric VNAV
BCAR	British civil airworthiness requirements
BITD	basic instrument training device
CAP	controller access parameters
CAT	commercial air transport
CAT I / II / III	category I / II / III
CBT	computer-based training
CC	cabin crew
CDFA	continuous descent final approach
CDL	configuration deviation list
CFIT	controlled flight into terrain
CG	centre of gravity
CLB	climb
CM	context management
CMV	converted meteorological visibility
CofA	certificate of airworthiness

COM	communication (EBT competency)
COP	code of practice
CoR	certificate of registration
COSPAS-SARSAT	cosmicheskaya sistyema poiska avariynich sudov - search and rescue satellite-aided tracking
CP	committal point
CPA	closest point of approach
CPDLC	controller pilot data link communication
C-PED	controlled portable electronic device
CPL	commercial pilot licence
CRE	class rating examiner
CRI	class rating instructor
CRM	crew resource management
CRZ	cruise
CS	Certification Specifications
CSP	communication service provider
CVR	cockpit voice recorder
CVS	combined vision system
DA	decision altitude
DA/H	decision altitude/height
DAP	downlinked aircraft parameters
D-ATIS	digital automatic terminal information service
DC	direct current
DCL	departure clearance
DES	descent
D-FIS	data link flight information service
DG	dangerous goods
DH	decision height
DI	daily inspection
DIFF	deck integrated fire fighting system
DLR	data link recorder
DME	distance measuring equipment
D-METAR	data link - meteorological aerodrome report
D-OTIS	data link - operational terminal information service
DPATO	defined point after take-off
DPBL	defined point before landing
DR	decision range
DSTRK	desired track
EBT	evidence-based training
EC	European Community
ECAC	European Civil Aviation Conference
EFB	electronic flight bag
EFIS	electronic flight instrument system
EFVS	enhanced flight vision system
EFVS-A	enhanced flight vision system used for approach
EFVS-L	enhanced flight vision system used for landing
EGNOS	European geostationary navigation overlay service
EGT	exhaust gas temperature
ELT	emergency locator transmitter
ELT(AD)	emergency locator transmitter (automatically deployable)
ELT(AF)	emergency locator transmitter (automatic fixed)
ELT(DT)	emergency locator transmitter (distress tracking)
ELT(AP)	emergency locator transmitter (automatic portable)
ELT(S)	survival emergency locator transmitter
EPE	estimated position of error
EPR	engine pressure ratio
EPU	estimated position of uncertainty
ERA	en-route alternate (aerodrome)
ERP	emergency response plan
ETOPS	extended range operations with two-engined aeroplanes

EU	European Union
EUROCAE	European Organisation for Civil Aviation Equipment
EVAL	evaluation phase
EVS	enhanced vision system
FAA	Federal Aviation Administration
FAF	final approach fix
FALS	full approach lighting system
FANS	future air navigation systems
FAP	final approach point
FAR	Federal Aviation Regulation
FAS	final approach segment
FATO	final approach and take-off
FC	flight crew
FCL	flight crew licensing
FCOM	flight crew operating manual
FDM	flight data monitoring
FDO	flying display operation
FDR	flight data recorder
FFS	full flight simulator
FGS	flight control/guidance system
FI	flight instructor
FLIPCY	flight plan consistency
FLTA	forward-looking terrain avoidance
FMECA	failure mode, effects and criticality analysis
FMS	flight management system
FNPT	flight and navigation procedures trainer
FOD	foreign object damage
FOSA	flight operational safety assessment
FOV	field of view
FPA	flight path management — automation (EBT competency)
FPM	flight path management — manual control (EBT competency)
fpm	feet per minute
FRT	fixed radius transition
FSTD	flight simulation training device
ft	feet
FTD	flight training device
FTE	full time equivalent
FTE	flight technical error
FTL	flight and duty time limitations
g	gram
GAGAN	GPS aided geo augmented navigation
GBAS	ground-based augmentation system
GCAS	ground collision avoidance system
GEN	general
GIDS	ground ice detection system
GLS	GBAS landing system
GM	Guidance Material
GMP	general medical practitioner
GND	ground
GNSS	global navigation satellite system
GPS	global positioning system
GPWS	ground proximity warning system
H	helicopter
HEMS	helicopter emergency medical service
HF	high frequency
Hg	mercury
HHO	helicopter hoist operation
HIALS	high intensity approach lighting system
HIGE	hover in ground effect
HLL	helideck limitations list

HOGE	hover out of ground effect
HoT	hold-over time
hPa	hectopascals
HPL	human performance and limitations
HUD	head-up display
HUDLS	head-up guidance landing system
HUMS	health usage monitor system
IAF	initial approach fix
IALS	intermediate approach lighting system
IAP	instrument approach procedure
ICAO	International Civil Aviation Organization
IDE	instruments, data and equipment
IF	intermediate fix
IFR	instrument flight rules
IFSD	in-flight shutdown
IGE	in ground effect
ILS	instrument landing system
IMC	instrument meteorological conditions
in	inches
INS	inertial navigation system
IP	intermediate point
IR	Implementing Rule
IR	instrument rating
IRS	inertial reference system
ISA	international standard atmosphere
ISI	in-seat instruction
ISO	International Organization for Standardization
IV	intravenous
JAA	Joint Aviation Authorities
JAR	Joint Aviation Requirements
kg	kilograms
km	kilometres
KNO	application of knowledge (EBT competency)
kt	knots
LDA	landing distance available
LDF	landing distance factor
LDG	landing
LDP	landing decision point
LDTA	landing distance at time of arrival
LED	light-emitting diode
LHO	local helicopter operation
LHS	left-hand seat
LIFUS	line flying under supervision
LNAV	lateral navigation
LoA	letter of acceptance
LOC	localiser
LOC-I	loss of control in-flight
LOE	line-oriented evaluation
LOFT	line-oriented flight training
LOQE	line-oriented quality evaluation
LOS	limited obstacle surface
LP	Localiser performance
LPV	localiser performance with vertical guidance
LRCS	long range communication system
LRNS	long range navigation system
LSAA	landing system assessment area
LTW	Leadership and teamwork (EBT competency)
LVO	low visibility operation
LVP	low visibility procedures
LVTO	low visibility take-off

m	metres
MALS	medium intensity approach lighting system
MALSF	medium intensity approach lighting system with sequenced flashing lights
MALSR	medium intensity approach lighting system with runway alignment indicator lights
MAPt	missed approach point
MCTOM	maximum certified take-off mass
MDA	minimum descent altitude
MDH	minimum descent height
MEA	minimum en-route altitude
MED	medical
MEL	minimum equipment list
METAR	meteorological aerodrome report
MGA	minimum grid altitude
MHA	minimum holding altitude
MHz	megahertz
MID	midpoint
MLR	manuals, logs and records
MLS	microwave landing system
MLX	millilux
mm	millimetres
MM	multi-mode
MMEL	master minimum equipment list
MNPS	minimum navigation performance specifications
MOC	minimum obstacle clearance
MOCA	minimum obstacle clearance altitude
MOPSC	maximum operational passenger seating configuration
MORA	minimum off-route altitude
MPSC	maximum passenger seating capacity
MSA	minimum sector altitude
MSAS	multi-functional satellite augmentation system
MT	manoeuvres training phase
MTCA	minimum terrain clearance altitude
N	North
NADP	noise abatement departure procedure
NALS	no approach lighting system
NCC	non-commercial operations with complex motor-powered aircraft
NCO	non-commercial operations with other-than-complex motor-powered aircraft
N_F	free power turbine speed
N_G	engine gas generator speed
NM	nautical miles
NOTAM	notice to airmen
NOTECHS	non-technical skills evaluation
NOTOC	notification to captain
NPA	non-precision approach
NPA	Notice of Proposed Amendment
NSE	navigation system error
NVD	night vision device
NVG	night vision goggles
NVIS	night vision imaging system
OAT	outside air temperature
OB	observable behaviour
OCH	obstacle clearance height
OCL	oceanic clearance
ODALS	omnidirectional approach lighting system
OEI	one-engine-inoperative
OFS	obstacle-free surface
OFZ	obstacle free zone
OGE	out of ground effect
OIP	offset initiation point
OM	operations manual

OML	operational multi-pilot limitation
ONC	operational navigation chart
OPS	operations
ORO	Organisation Requirements for Air Operations
OTS CAT II	other than standard category II
PAPI	precision approach path indicator
PAR	precision approach radar
PBCS	performance-based communication and surveillance
PBE	protective breathing equipment
PBN	performance-based navigation
PC/PT	proficiency check/proficiency training
PCDS	personnel carrying device system
PDA	premature descent alert
PDP	predetermined point
PED	portable electronic device
PFC	porous friction course
PIC	pilot-in-command
PIN	personal identification number
PIS	public interest site
PLB	personal locator beacon
PNR	point of no return
POH	pilot’s operating handbook
PRM	person with reduced mobility
PRO	application of procedures (EBT competency)
PSD	problem-solving & decision making (EBT competency)
PVD	paravisual display
QAR	quick access recorder
QFE	atmospheric pressure at aerodrome elevation / runway threshold
QNH	atmospheric pressure at nautical height
RA	resolution advisory
RAIM	receiver autonomous integrity monitoring
RAT	ram air turbine
RCAM	runway condition assessment matrix
RCC	rescue coordination centre
RCF	reduced contingency fuel
RCLL	runway centre line lights
RCP	required communication performance
RCR	runway condition report
RF	radius to fix
RF	radio frequency
RFC	route facility chart
RI	ramp inspection
RI	rectification interval
RIE	rectification interval extension
RMA	regional monitoring agency
RNAV	area navigation
RNP	required navigation performance
RNP APCH	RNP approach
RNP AR APCH	RNP approach for which authorisation is required
ROD	rate of descent
RP	rotation point
RSP	required surveillance performance
RTCA	Radio Technical Commission for Aeronautics
RTODAH	rejected take-off distance available (helicopters)
RTODRH	rejected take-off distance required (helicopters)
RTOM	reduced take-off mass
RTZL	runway touchdown zone lights
RVR	runway visual range
RVSM	reduced vertical separation minima
RWYCC	runway condition code

S	South
SA CAT I	special authorisation category I
SA CAT II	special authorisation category II
SAFA	safety assessment of foreign aircraft
SALS	simple approach lighting system
SALSF	simple approach lighting system with sequenced flashing lights
SAp	stabilised approach
SAP	system access parameters
SAR	search and rescue
SAS	stability augmentation system
SAW	situation awareness (EBT competency)
SBAS	satellite-based augmentation system
SBT	scenario-based training
SCC	senior cabin crew
SCP	special category of passenger
SDCM	system of differential correction and monitoring
SFE	synthetic flight examiner
SFI	synthetic flight instructor
SID	standard instrument departure
SMM	safety management manual
SMS	safety management system
SNAS	satellite navigation augmentation system
SOP	standard operating procedure
SPA	operations requiring specific approvals
SPECI	aviation selected special weather report
SPO	specialised operations
SRA	surveillance radar approach
SSALF	simplified short approach lighting system with sequenced flashing lights
SSALR	simplified short approach lighting system with runway alignment indicator lights
SSALS	simplified short approach lighting system
SSEC	static source error correction
SSR	secondary surveillance radar
STAR	standard terminal arrival route
STC	supplemental type certificate
SVS	synthetic vision system
TA	traffic advisory
TAC	terminal approach chart
TAS	true airspeed
TAWS	terrain awareness warning system
TC	technical crew
TC	type certificate
TCAS	traffic collision avoidance system
TCCA	Transport Canada Civil Aviation
TCH	type certificate holder
TDP	take-off decision point
TDZ	touchdown zone
TDZE	touchdown zone elevation
THR	threshold
TI	Technical Instructions
TIT	turbine inlet temperature
TLS	target level of safety
TMG	touring motor glider
TO	take-off
TODA	take-off distance available (aeroplanes)
TODAH	take-off distance available (helicopters)
TODRH	take-off distance required (helicopters)
TOGA	take-off/go around
TORA	take-off run available
T-PED	transmitting portable electronic device
TRE	type rating examiner

TRI	type rating instructor
TSE	total system error
TVE	total vertical error
TWIP	terminal weather information for pilots
UMS	usage monitoring system
UPRT	upset prevention and recovery training
UTC	coordinated universal time
V_2	take-off safety speed
V_{50}	stalling speed
V_{AT}	indicated airspeed at threshold
VDF	VHF direction finder
VFR	visual flight rules
VHF	very high frequency
VIS	visibility
VMC	visual meteorological conditions
V_{MO}	maximum operating speed
VNAV	vertical navigation
VOR	VHF omnidirectional radio range
VSS	visual segment surface
V_T	threshold speed
VTOL	vertical take-off and landing
V_{TOSS}	take-off safety speed
WAAS	wide area augmentation system
WAC	world aeronautical chart
WIFI	wireless fidelity
WLM	workload management (EBT competency)
ZFTT	zero flight-time training

The following GM28 is inserted:

GM28 Annex I Definitions for terms used in Annex II to VIII

FLIGHT MONITORING AND FLIGHT WATCH – RELEVANT SAFETY INFORMATION

Relevant safety information is any element that may affect the safety of the flight, such as:

(a) an aircraft technical failure (e.g. failures where flight operations personnel can help to calculate the landing distance or new trip fuel or to update the aerodrome minima);

(b) unforeseen hazards:

(1) air traffic (e.g. delays and/or long distance to complete the approach, extensive use of radar vectoring);

(2) meteorological conditions (e.g. DH and aerodrome operating minima, adverse or extreme meteorological conditions);

(3) aerodrome and runway status (e.g. insufficient runway length due to brake failure, obstruction or closure of the runway, runway contamination, failure or malfunction caused by on-ground navigation or approach equipment);

(4) navigation aid status (e.g. failure of the navigation aids);

(5) availability of communications (e.g. failure of communications capabilities, interruptions, interferences, change of frequency channels); and

(6) terrain and obstacles (e.g. geophysical phenomena (volcanic eruptions, earthquakes, tsunami), difficult terrain at an unplanned aerodrome (large bodies of water, mountains);

(c) updates of the operational flight plan when they affect the fuel reserves:

(1) diversion to an en-route alternate (ERA)aerodrome, a destination alternate, or a take-off alternate aerodrome;

(2) change of the runway selected for landing if the new runway is shorter;

(3) location of the decision point or the point of no return (PNR) due to, for instance, change in altitude, in wind data, etc.;

(4) significant in-flight change of the flight route compared to the route in the flight planning; or

(5) significant deviation from the planned fuel consumption; and

(d) position reporting:

(1) flight-monitoring personnel should report in every phase of the flight: taxi, take-off, climb, cruise, cruise steep climb, descent, approach, landing;

(2) flight watch provides active tracking; and

(3) where no real-time automatic position-reporting is possible, the operator should have an acceptable alternative to ensure in-flight reporting at least every hour.

The following GM29 is inserted:

GM29 Annex I Definitions for terms used in Annex II to VIII

FUEL/ENERGY

The energy used for aircraft propulsion comes from various sources and is of various types.

A frequently used type of energy in aviation is derived from processing (in a piston or turbine engine) hydrocarbon-based fuels that include gasoline (leaded or unleaded), diesel, avgas, JET A-1, and JET B. Hydrogen may also be used as fuel for fuel cell applications, which generate electricity that is used to generate propulsion. However, as current technologies already use other sources of energy for aircraft propulsion, such as stored electrical energy, the typical term 'fuel' has become restrictive and no longer covers emerging technologies.

Therefore, a broader, combined term is introduced to accommodate new types of energy, other than fuel, used for aircraft propulsion purposes.

The term 'fuel/energy' should cater for both typical fuel and any other type or source of energy used for aircraft propulsion, including but not limited to electrical energy stored in batteries.

When used in the combination 'fuel/energy', the term 'energy' only refers to the electrical energy used for aircraft propulsion purposes. It does not include any other form of stored electrical energy that is used on board an aircraft (e.g. batteries of EFBs, ELTs, underwater locating devices (ULDs), automatic external defibrillators (AEDs), or backup energy sources).

The following GM30 is inserted:

GM30 Annex I Definitions for terms used in Annex II to VIII

FUEL/ENERGY EN-ROUTE ALRTERNATE (ERA) AERODROME

Fuel/energy ERA aerodromes could be used in the following cases:

(a) 'fuel ERA aerodrome critical scenario': that aerodrome is used when additional fuel is required at the most critical point along the route to comply with point (c)(6) of point CAT.OP.MPA.181 'Fuel/energy scheme — fuel/energy planning and in-flight re-planning policy — aeroplanes';

(b) 'fuel ERA aerodrome 3 %': that aerodrome is used when an operator reduces the contingency fuel to 3 %; and

(c) 'fuel ERA aerodrome PNR': that aerodrome is used at the PNR during isolated aerodrome operations.

The following GM31 is inserted:

GM31 Annex I Definitions

DEFINITIONS OF TERMS RELATED TO ALL-WEATHER OPERATIONS

The following terms and concepts are used in the provisions related to all-weather operations in theAMC and GM to UK Regulation (EU) No 965/2012:

'Advanced aircraft' means an aircraft with equipment in addition to that required for a basic aircraft for a given take-off, approach or landing operation.

'AFM or additional data from the TC/STC holder' — an AFM or additional data from the TC/STC holdermay provide:

— limitations, in accordance with which the aircraft must be operated, as described under point 4.1 of Annex V to UK Regulation (EU) 2018/1139. This means that the aircraft may NOT exceed those given values; or

— demonstrated capabilities, which are the assumptions, envelope or conditions that were used to demonstrate adequate performance to comply with the appropriate certification specifications.

However, some AFMs (especially for those aircraft or landing systems that were certified before the introduction of CS-AWO Issue 2) may not include all of the assumptions, envelope or conditions that were used to demonstrate adequate performance. Information regarding the assumptions, envelope, or conditions that were used to demonstrate adequate performance of a landing system can be provided by equivalent documentation issued by the TC/STC holder.

Other types of information issued by the TC/STC holder may include (not an exhaustive list):

— equivalence between different aircraft models (types);

— equivalence between aircraft types and variants;

— landing systems equivalence;

— a list of runways with their demonstrated performance;

— a letter of no-technical objection/ evaluation letter.

Note: 'TC/STC holder' should be understood as the holder of the certificate for the landing system.

'Basic aircraft' means an aircraft which has the minimum equipment required to perform the intended take-off, approach or landing operation.

'Continuous descent final approach (CDFA)': when the circling altitude/height is reached, it is acceptable to maintain altitude (level-off) and transition to the visual segment. The operator may provide a point in the visual segment in which the descent may be resumed to follow a continuous descent to a point approximately 15 m (50 ft) above the landing runway threshold or the point wherethe flare manoeuvre begins for the type of aircraft flown.

'Enhanced flight vision system (EFVS)-Approach (EFVS-A)' means a system that has been demonstrated to meet the criteria to be used for approach operations from a decision altitude/height (DA/H) or a minimum descent altitude/height (MDA/H) to 100 ft (30 m) threshold elevation while all system components are functioning as intended but may have failure modes that could result in theloss of EFVS capability. It should be assumed for an EFVS-A that:

(a) the pilot will conduct a go-around at or above 100 ft threshold elevation, in the event of an EFVSfailure; and

(b) descent below 100 ft above the threshold elevation through to touchdown and roll-out should be conducted using natural vision so that any failure of the EFVS does not prevent the pilot fromcompleting the approach and landing.

'Enhanced flight vision system (EFVS)-Landing (EFVS-L)' means a system that has been demonstrated to meet the criteria to be used for approach and landing operations that rely on sufficient visibility conditions to enable unaided roll-out and to mitigate for loss of EFVS function.

'Head-up display (HUD) or equivalent display system' means a display system which presents flight information to the pilot's forward external field of view (FOV), and which does not significantly restrict the external view.

'Landing system' means an airborne equipment, which:

(a) provides automatic control of the aircraft during the approach and landing (i.e. automaticlanding system); or

(b) has been demonstrated to meet the criteria to be used for approach and landing operations(e.g. HUD landing system, EFVS-L or any other approved system).

'Landing system assessment area (LSAA)' means the part of the runway that extends from thethreshold to a distance of 600 m from the threshold.

Note – Although the landing systems certification criteria use a value greater than 600m after the threshold to evaluate limit conditions, for the purpose of flight operations assessment a distance of 600m is the relevant part as landing beyond this point is not expected to occur in day-to-day operations. The LSAA may not necessarily be coincident with the touchdown zone. The touchdown zone is specified in CS-ADR DSN.

'Low-visibility procedures (LVPs)' means procedures applied by an aerodrome for the purpose of ensuring safety during low-visibility operations (LVOs).

'Regular runway' means a runway whose characteristics fit within the acceptable limits demonstrated by the original equipment manufacturer (OEM) during certification. The classification of a runway as a 'regular runway' is different from one set of equipment to another.

'Required visual reference' refers to 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, the required visual reference is the runway environment.

'Satellite-based augmentation system (SBAS)' means a wide coverage augmentation system in which the user receives augmentation information from a satellite-based transmitter. The most common form of SBAS in Europe is the European Geostationary Navigation Overlay Service (EGNOS).

'Synthetic vision system (SVS)' means a system that displays data derived synthetic images of the external scene from the perspective of the flight deck.

'Landing area' means that part of a movement area intended for the landing or take-off of aircraft.

'Touchdown zone (TDZ)' means the portion of a runway, beyond the threshold, where landing aeroplanes are intended to first contact the runway.

'Type B instrument approach operations categories': 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 requirements of the most demanding category. This does not apply if the RVR and/or DH has been approved as operational credits.

The following GM32 is inserted:

GM32 Annex I Definitions

DEFINITIONS OF TERMS RELATED TO ALL-WEATHER OPERATIONS

EFVSs — DIFFERENCES WITH ENHANCED VISION SYSTEMS (EVSs)

(a) Introduction to EVSs

EVSs use sensing technology to improve a pilot's ability to detect objects and topographical features ahead of the aircraft. Different types of sensing technology are used on different aircraft installations. Sensing technologies used include forward-looking infrared, millimetre wave radiometry, millimetre wave radar or low-light level intensification; additional technologies may be developed in the future. The image from sensors may be displayed to the pilot in a number of different ways including 'head-up' and 'head-down' displays.

(b) EVSs and EFVSs

An EFVS is an EVS that is integrated with a flight guidance system, which presents the image from sensors to the pilot on a head-up display (HUD) or equivalent display. If EFVS equipment is certified according to the applicable airworthiness requirements and an operator holds the necessary specific approval, then an EFVS may be used for EFVS operations. An EFVS operation is an operation with an operational credit which allows operating in visibility conditions lower than those in which operations without the use of EFVS are permitted.

(c) Functions of EVSs

Depending on the capabilities of the particular system, EVSs may be useful during operations at night or in reduced visibility for the following:

(1) improving visibility of airport features and other traffic during ground operations;

(2) displaying terrain and obstructions in flight;

(3) displaying weather in flight;

(4) improving visibility of the runway environment during approach operations; and

(5) improving visibility of obstructions on a runway (e.g. aircraft, vehicles or animals) during take-off and approach operations.

(d) Limitations of EVSs

EVSs are a useful tool for enhancing situational awareness; however, each EVS installation has its own specific limitations. These may include:

(1) Performance variations depend on conditions including ambient temperature and lighting and weather phenomena. A system may provide very different image qualities in the same visibility depending on the particular phenomena causing restricted visibility, e.g. haze, rain, fog, snow, dust, etc.

(2) An EVS may not be able to detect certain types of artificial lighting. Light emitting diode (LED) lights have a much lower infrared signature than incandescent lights and therefore may not be detected by some types of EVSs. LED lighting is used for runway, taxiway and approach lighting at many airports.

(3) Monochrome display. EVSs will generally not be able to detect and display the colour of airport lighting. This means that colour coding used on airport lighting will not be visible to the pilot using an EVS.

(4) Many EVS installations do not have redundancy, so a single failure may lead to loss of EVS image.

(5) The location of the sensor on the airframe may mean that in certain conditions it could be susceptible to ice accretion or obscuration from impact damage from objects such as insects or birds.

(6) Where an EVS image is presented on a HUD or an equivalent display, the image needs to be consistent with the pilot's external view through the display. Particular installations may have limitations on the conditions under which this consistent image can be generated (e.g. crosswind conditions during approach).

(7) Imaging sensor performance can be variable and unpredictable. Pilots should not assume that a flightpath is free of hazards because none are visible in an EVS image.

(e) Considerations for the use of EVSs

EVSs may be used in all phases of flight and have significant potential to enhance the pilot's situational awareness. No specific approval is required for the use of an EVS; however, the operator is responsible for ensuring that the flight crew members have received training on the equipment installed on their aircraft in accordance with ORO.FC.120. In addition, the operator is responsible for evaluating the risks associated with system limitations and for implementing suitable mitigation measures in accordance with ORO.GEN.200(a)(3) before using the EVS.

The use of EVSs does not permit the use of different operating minima, and EVS images cannot replace natural vision for the required visual reference in any phase of flight including take-off, approach or landing.

An EVS that is not an EFVS cannot be used for EFVS operations and therefore does not obtain an operational credit.

The following GM33 is inserted:

GM33 Annex I Definitions

INSTRUMENT APPROACH OPERATIONS

(a) Depending on the instrument approach procedure (IAP) in use, the lateral and vertical navigation guidance for an instrument approach operation may be provided by:

(1) a ground-based radio navigation aid; or

(2) computer-generated navigation data from ground-based, space-based or self-contained navigation aids or a combination of these.

(b) A non-precision approach (NPA) procedure flown as CDFA with vertical path guidance calculated by on-board equipment is considered to be a 3D instrument approach operation. Depending on the limitations of the equipment and information sources used to generate vertical guidance, it may be necessary for the pilot to cross-check this guidance against other navigational sources during the approach and to ensure that the minimum altitude/height over published step-down fixes is observed. CDFAs with manual calculation of the required rate of descent are considered 2D operations.

(c) Further guidance on the classification of an instrument approach operation based on the designed lowest operating minima is contained in Appendix J to ICAO Doc 9365 Manual of All-Weather Operations, Fourth Edition, 2017.

The following GM34 is inserted:

GM34 Annex I Definitions

DECISION ALTITUDE (DA) OR DECISION HEIGHT (DH)

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

(b) For operations using DA, the aircraft altimeters are set to QNH. For operations using a barometric DH, the aircraft altimeters are set to QFE.

(c) For SA CAT I, SA CAT II, CAT II/III operations, the DH is based on the use of a radio altimeter or other devices capable of providing equivalent performance. The DH is determined with reference to threshold elevation, but the value of the DH set for the approach will be based on the height of the aircraft above the pre-threshold terrain, which may be higher or lower than the threshold.

(d) For convenience, when both expressions are used, they may be written in the form 'decision altitude/height' and abbreviated 'DA/H'.

The following GM35 is inserted:

GM35 Annex I Definitions

MINIMUM DESCENT ALTITUDE (MDA) OR MINIMUM DESCENT HEIGHT (MDH)

(a) Minimum descent altitude (MDA) is referenced to mean sea level and minimum descent height (MDH) is referenced to the aerodrome elevation or to the threshold elevation if that is more than 7 ft below the aerodrome elevation. An MDH for a circling approach is referenced to the aerodrome elevation.

(b) For operations using MDA, the aircraft altimeters are set to QNH. For operations using a barometric MDH, the aircraft altimeters are set to QFE.

(c) For convenience, when both expressions are used, they may be written in the form 'minimum descent altitude/height' and abbreviated 'MDA/H'.

Annex II Part ARO

Annex II Part ARO is amended as follows:

The following AMC5 ARO.OPS.200 is inserted:

AMC5 ARO.OPS.200 Specific approval procedure

PROCEDURES FOR THE APPROVAL OF LOW-VISIBILITY OPERATIONS

Before issuing an approval for low-visibility operations (LVOs), the CAA should verify that the applicant has:

(a) taken account of the relevant airworthiness requirements and limitations;

(b) established the relevant aerodrome operating minima;

(c) established and documented the relevant operating procedures;

(d) established and conducted adequate training and checking programmes;

(e) adopted the minimum equipment list (MEL) for the LVOs to be undertaken;

(f) processes to ensure that only runways and instrument procedures suitable for the intended operations are used; and

(g) established and conducted the relevant risk assessment and monitoring programmes.

The following AMC1 ARO.OPS.225 is inserted:

AMC1 ARO.OPS.225 Approval of fuel/energy schemes

OVERSIGHT — VERIFICATION OF COMPLIANCE OF FUEL SCHEMES FOR CAT OPERATIONS WITH AEROPLANES

(a) When approving a basic fuel scheme, the CAA should be satisfied that the operator fulfils the applicable criteria of point CAT.OP.MPA.180(a)(3)(i), taking into account the elements contained in the AMC applicable to the basic fuel scheme.

(b) When approving a basic fuel scheme with variations, the CAA should be satisfied that the operator fulfils the applicable criteria of point CAT.OP.MPA.180(a)(3)(ii), taking into account the elements contained in the AMC applicable to the variation.

(c) When approving an individual fuel scheme that deviates, fully or partly, from the basic fuel scheme, the CAA should be satisfied that the operator fulfils the applicable criteria of point CAT.OP.MPA.180(a)(3)(iii), taking into account the elements contained in the AMC applicable to the individual fuel scheme. Before issuing the approval of an individual fuel scheme, the CAA should verify the following:

(1) the maturity, capability, and suitability of the operator's management system;

(2) the adequacy of the system for exercising operational control;

(3) the adequacy of the operator's SOPs;

(4) the resolution of significant findings in the areas that support the application of the individual fuel scheme;

(5) the suitability of the communications and navigation equipment of the aircraft fleet to which the individual fuel scheme will apply;

(6) the areas of operation where the individual fuel scheme will be used;

(7) the operator's ability to provide reliable and accurate aircraft-specific fuel data;

(8) the suitability of the relevant training programmes, including those for flight crew and operational control personnel;

(9) the experience of the personnel concerned, particularly of the flight crew, in the use of the procedures and systems that support the individual fuel scheme;

(10) any low-fuel events (including emergency fuel conditions) in the operator's safety records; and

(11) the maintenance of the fleet in terms of reliability of the fuel system, including the accuracy of the fuel-measurement systems.

GM1 ARO.OPS.225 is replaced by the following:

GM1 ARO.OPS.225 Approval of fuel/energy schemes

OPERATIONS TO AN ISOLATED AERODROME — GENERAL

The use of an isolated aerodrome exposes both the aircraft and passengers to a greater risk than ~~to~~ in operations where a destination alternate aerodrome is available. ~~Whether an aerodrome is classified as an isolated aerodrome or not often depends on which aircraft are used for operating the aerodrome.~~ The CAA should, therefore, assess whether all possible means are applied to mitigate that ~~the~~ greater risk.

The following GM 2 ARO.OPS.225 is inserted:

GM2 ARO.OPS.225 Approval of fuel/energy schemes

ASSESSMENT AND OVERSIGHT OF POLICIES ASSOCIATED WITH FUEL SCHEMES

The CAA's assessment and oversight of:

— the fuel planning and in-flight re-planning policy;

— the selection-of-aerodromes policy; and

— the in-flight fuel management policy

may follow a two-step process: firstly, assess and oversee each policy individually, and secondly, and more importantly, assess and oversee all the policies together.

The CAA should be satisfied with regard to the following:

— the robustness of the operator's management system, particularly with regard to safety risk management; and

— in case of basic fuel schemes with variations and individual fuel schemes, the operator's processes for performance monitoring and measurement.

The following AMC1 ARO.OPS.225(c) is inserted:

AMC1 ARO.OPS.225(c) Approval of fuel/energy schemes

APPROVAL OF INDIVIDUAL FUEL SCHEMES — QUALIFICATION OF PERSONNEL

(a) In accordance with point **ARO.GEN.200(a)(2),** the CAA is required to have qualified personnel to perform the tasks under their responsibility. To approve individual fuel schemes, the CAA's inspectors should have the necessary knowledge and expertise to understand, monitor, and validate the criteria of point (c) of **AMC1 ARO.OPS.225.**

(b) For this purpose, the inspectors should be able to understand the relevance and meaningfulness of the operator's safety performance indicators (SPIs), targets, and means by which these targets are achieved.

(c) The CAA should develop guidance to be used by its inspectors when approving and verifying individual fuel schemes.

The following AMC2 ARO.OPS.225(c) is inserted:

AMC2 ARO.OPS.225(c) Approval of fuel/energy schemes

APPROVAL OF INDIVIDUAL FUEL SCHEMES — APPLICATION OF INDIVIDUAL FUEL SCHEMES – GUIDANCE TO PERSONNEL

According to points ARO.GEN.115 and ARO.GEN.200(a)(1), the CAA is required to develop guidance on the application of individual fuel schemes to be used by its inspectors. Such guidance should cover the following:

(a) the operator's responsibilities:

(1) operational control systems (organisational control over internal processes);

(2) policies and procedures;

(3) qualified personnel:

(i) competence and experience of both flight crew and operational control personnel; and

(ii) their training;

(4) SOP compliance and suitability;

(5) monitoring of the effectiveness of individual fuel scheme processes; and

(6) continuous improvement;

(b) operational characteristics:

(1) of the aircraft: current aircraft-specific data derived from a fuel consumption monitoring system; and

(2) of the area of operations:

(i) aerodrome technologies;

(ii) meteorological information capabilities;

(iii) ATM infrastructure; and

(iv) aerodrome capabilities and ATS characteristics;

(3) a suitable computerised flight plan;

(4) flight monitoring or flight watch capabilities, as applicable;

(5) communications systems: ground-based and airborne systems;

(6) navigation systems: ground-based and airborne systems; and

(7) reliable meteorological and aerodrome information; and

(c) safety risk management:

(1) agreed SPIs;

(2) risk register;

(3) identification of hazards;

(4) risk monitoring; and

(5) compliance monitoring.

When collecting statistically relevant data, the CAA inspectors should consider the specificities of the operations of each operator. As a minimum, the data should be collected for a period of 2 years.

Note: Further guidance is provided in ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual*, Appendix 7 to Chapter 5 *A performance-based approach job-aid for an approving authority* (1st Edition, 2015).

The following GM1 ARO.OPS.225(c) is inserted:

GM1 ARO.OPS.225(C) Approval of fuel/energy schemes

INDIVIDUAL FUEL SCHEMES – RESOLUTION OF SIGNIFICANT FINDINGS

The approval of an individual fuel scheme may be rejected, suspended or revoked when the operator has not resolved the relevant findings, or when there are unacceptable open findings that affect the areas that support individual fuel schemes (e.g. operational control, safety management system, safety risk assessment processes, availability of data, SPIs, pilot training, etc.).

Annex III – Part-ORO

Annex III is amended as follows:

GM1 ORO.GEN.110(c) is replaced by the following:

GM1 ORO.GEN.110(c) Operator responsibilities

OPERATIONAL CONTROL

(a) Point **ORO.GEN.110(c)** does not imply a requirement for licensed flight operations officers/flight dispatchers.

(b) If the operator uses ~~employs~~ flight operations officers (FOOs)/flight dispatchers (FDs) in conjunction with a method of operational control, training for that ~~these~~ personnel should be based on the relevant parts of ICAO Annex 1 and ICAO Documents 10106 and 9868 ~~Doc 7192 Training Manual, Part D-3.~~ This training should be described in the OM ~~operations manual~~.

The following AMC1 ORO.GEN.110(c) & (e) is inserted:

AMC1 ORO.GEN.110 (c) & (e) Operator responsibilities

PERSONNEL RESPONSIBILITIES – OPERATIONAL CONTROL PERSONNEL THAT PERFORM TASKS REALTED TO FLIGHT MONITORING AND FLIGHT WATCH – TRAINING PROGRAMME

(a) When a CAT operator uses flight monitoring or flight watch as functions of a system for exercising operational control, FOOs/FDs should perform those functions.

(b) The CAT operator should develop a training programme, based on the relevant parts of ICAO Annex 1, ICAO Documents 10106 and 9868, for FOOs/FDs that perform those functions.

(c) The training programme specified above should be detailed in the OM of the CAT operator and should be delivered by an instructor for operational control personnel.

INITIAL TRAINING

(d) The initial training should include, where relevant to the intended operation, the following elements that should be tailored to the specific duties assigned to each person:

(1) air law: rules and regulations relevant to the task assignment, appropriate ATS practices and procedures;

(2) aircraft general knowledge:

(i) principles of operation of aeroplane engines/systems/instruments;

(ii) operating limitations of aeroplanes and engines; and

(iii) MEL and configuration deviation list (CDL);

(3) flight performance calculation, planning procedures, and loading:

(i) effects of loading and mass distribution on aircraft performance and flight characteristics; mass and balance calculations;

(ii) operational flight planning; fuel consumption and endurance calculations; alternate aerodrome selection procedures; en-route cruising control; extended range operation;

(iii) preparation and filing of ATS flight plans; and

(iv) basic principles of computer-assisted planning systems;

(4) human performance: human performance related to operational control duties, including principles of threat and error management (TEM); guidance material on how to design training programmes on human performance, including on TEM, is provided in ICAO Doc 9683 *Human Factors Training Manual;*

(5) meteorology:

(A) aeronautical meteorology; movement of pressure systems; structure of fronts; origin and characteristics of significant weather phenomena that affect take-off, en-route, and landing conditions;

(B) interpretation and application of aeronautical meteorological reports, charts, and forecasts; codes and abbreviations; use of, and procedures for, obtaining meteorological information;

(C) effects of meteorological conditions on aircraft operation and on radio reception in the aircraft that is used by the operator; and

(D) all-weather operations;

(6) navigation:

(A) principles of air navigation with particular reference to IFR; and

(B) navigation and radio equipment in the aircraft that is used by the operator;

(7) operational procedures:

(A) use of aeronautical documentation and SOPs;

(B) procedures for operations beyond 60 minutes from an adequate aerodrome, including, if applicable, extended-diversion-time operations (EDTOs);

(C) operational procedures for the carriage of cargo and dangerous goods;

(D) de-icing/anti-icing;

(E) procedures related to aircraft accidents and incidents; emergency flight procedures; and

(F) security procedures related to unlawful interference and sabotage of aircraft;

(8) principles of flight: principles of flight related to the appropriate category of aircraft;

(9) radio communications: procedures for communicating with other aircraft and ground stations; and

(10) special aerodromes.

OPERATOR-SPECIFIC TRAINING

(e) In addition to the initial training, FOOs/FDs should receive training in the specific duties, responsibilities, and tools that are associated with the operational control system of the operator.

RECURRENT TRAINING

(f) When the recurrent training is conducted within the last 12 months of a 36-month validity period, the next 36-month validity period should be calculated from the original expiry date of the previous assessment.

(g) Notwithstanding the 36-month interval of point (f), recurrent training may also be performed at shorter intervals and adjusted to the needs identified after an assessment of the training needs conducted by the operator.

KNOWLEDGE, SKILLS, AND QUALIFICATIONS FOR INSTRUCTORS OF OPERATIONAL CONTROL PERSONNEL

(h) Unless otherwise required by the relevant national regulations, instructors for operational control personnel should:

(1) be able to prove that they are current in the subjects covered by the training programme for FOOs/FDs, including the operator-specific elements, or otherwise successfully complete an FOO/FD training programme;

(2) have adequate instructional skills or attend instructor training; if more than 24 months have passed since the delivery of the last FOO/FD course, they should attend recurrent instructor training before delivering the next course; and

(3) have relevant work experience in the areas of the training that they provide.

(i) The CAT operator should include in the OM the required knowledge, skills, and qualifications of the instructors for operational control personnel.

The following AMC2 ORO.GEN.110(f) is inserted:

AMC2 ORO.GEN.110(f) Operator responsibilities

INSTRUCTIONS ABOUT DUTIES AND RESPONSIBILITIES OF PERSONNEL – BRIEFING OF FLIGHT OPERATIONS OFFICERS/FLIGHT DISPATCHERS BEFORE ASSUMING DUTIES

In the context of an ongoing flight-following, flight-monitoring, or flight-watch activity, an FOO/FD, before assuming duties, should be briefed on the elements related to the safety of the operations the FOO/FD will be performing as part of the operational control.

The following GM2 ORO.GEN.110(f) is inserted:

GM2 ORO.GEN.110(f) Operator responsibilities

ELEMENTS OF THE BRIEFING GIVEN TO FLIGHT OPERATIONS OFFICERS/FLIGHT DISPATCHERS BEFORE ASSUMING DUTIES

Before commencing their shift, the FOO/FD should be briefed on relevant safety information such as:

(a) weather charts;

(b) weather reports;

(c) NOTAMs;

(d) operational restrictions in force;

(e) flights in the air and flights for which operational flight plans have been issued but which have not yet started and for which the FOO/FD will be responsible;

(f) the forecast flight schedule; and

(g) other relevant safety information as listed in GM 28 Annex I 'Definitions for terms used in Annexes II to VIII'.

GM1 ORO.GEN.130(b) is replaced by the following:

GM1 ORO.GEN.130(b) Changes related to an AOC holder

CHANGES REQUIRING PRIOR APPROVAL

The following GM is a non-exhaustive checklist of items that require prior approval from the CAA as specified in the applicable Implementing Rules:

(a) alternative means of compliance;

(b) procedures regarding items to be notified to the CAA;

(c) cabin crew:

   (1) conduct of the training, examination and checking required by Annex V (Part-CC) to ~~Commission~~ UK Regulation (EU) No 1178/2011 and issue of cabin crew attestations;

   (2) procedures for cabin crew to operate on four aircraft types;

   (3) training programmes, including syllabi;

(d) leasing agreements;

(e) procedure for the use of aircraft included in an AOC by other operators for NCC, NCO and specialised operations, as required by **ORO.GEN.310**;

(f) specific approvals in accordance with Annex V (Part-SPA);

(g) dangerous goods training programmes;

(h) flight crew:

(1) alternative training and qualification programmes (ATQPs);

(2) procedures for flight crew to operate on more than one type or variant;

(3) training and checking programmes, including syllabi and use of flight simulation training devices (FSTDs);

(i) ~~fuel policy~~ fuel schemes and special refuelling or defuelling of aeroplanes;

(j) helicopter operations:

(1) over a hostile environment located outside a congested area, unless the operator holds an approval to operate according to Subpart J *HELICOPTER EMERGENCY MEDICAL SERVICE OPERATIONS* of Annex V (Part-SPA ~~SPA.HEMS~~);

(2) to/from a public interest site;

(3) without an assured safe forced landing capability; and

(4) during refuelling with rotors turning;

(k) mass and balance: standard masses for load items other than standard masses for passengers and checked baggage;

(l) minimum equipment list (MEL):

(1) MEL;

(2) operating other than in accordance with the MEL, but within the constraints of the master minimum equipment list (MMEL);

(3) rectification interval extension (RIE) procedures;

(m) minimum flight altitudes:

(1) the method for establishing minimum flight altitudes;

(2) descent procedures to fly below specified minimum altitudes;

(n) performance:

(1) increased bank angles at take-off (for performance class A aeroplanes);

(2) short landing operations (for performance class A and B aeroplanes);

(3) steep approach operations (for performance class A and B aeroplanes);

(4) reduced required landing distance operations (for performance class A and B aeroplanes);

(o) isolated aerodrome: using an isolated aerodrome as destination aerodrome for operations with aeroplanes;

(p) method used to establish aerodrome operating minima;

(~~p~~ q) approach flight technique:

(1) all approaches not flown as stabilised approaches for a particular approach to a particular runway;

(2) non-precision approaches not flown with the continuous descent final approach (CDFA) technique for each particular approach/runway combination;

(~~q~~ r) maximum distance from an adequate aerodrome for two-engined aeroplanes without an extended range operations with two-engined aeroplanes (ETOPS) approval:

(1) air operations with two-engined performance class A aeroplanes with a maximum operational passenger seating configuration (MOPSC) of 19 or less and a maximum take-off mass less than 45 360 kg, over a route that contains a point further than 120 minutes from an adequate aerodrome, under standard conditions in still air;

(~~r~~ s) aircraft categories:

(1) Applying a lower landing mass than the maximum certified landing mass for determining the indicated airspeed at threshold (VAT).

(~~s~~ t) commercial air transport operations with single-engined turbine aeroplanes in instrument meteorological conditions or at night (CAT SET-IMC).

AMC 3 ORO.GEN.160 is inserted:

AMC3 ORO.GEN.160 Occurrence reporting

REPORTABLE EVENTS OF LVOs

(a) A reportable event should include:

(1) significant deviations from the flight path not caused by flight crew input;

(2) misleading information without flight deck alerts;

(3) loss of airborne navigation equipment functions necessary for the operation;

(4) loss of functions or facilities at the aerodrome necessary for the operation, including aerodrome operating procedures, ATC operation, navigation facilities, visual aids and electrical power supply;

(5) loss of other functions related to external infrastructure necessary for the operation; and

(6) any other event causing the approach or landing to be abandoned if occurring repeatedly.

(b) The reports should be submitted to the aerodrome involved when relevant and in addition to the recipients prescribed in ORO.GEN.160(b).

The following GM1 ORO.GEN.160 is inserted:

GM1 ORO.GEN.160 Occurrence reporting

REPORTABLE EVENTS OF LVOs — OTHER EVENTS OCCURRING REPEATEDLY

(a) The purpose of point (a)(6) of AMC3 ORO.GEN.160 is to share the information with aviation stakeholders other than the operator of the aircraft to identify yet unknown systemetic safety-related issues. The main focus is thus on a series of similar events rather that an isolated single event.

(b) Other events causing the approach or landing to be abandoned may include but are not limited to:

(1) erroneous or inadequate flight crew action or aircraft handling; or

(2) meteorological phenomena or human-made disturbances (e.g. road crossing final approach in an EFVS approach, laser strikes, etc.) or emissions from infrastructures (e.g. 5G) which require flight crews to take corrective action to an extent to which the LVO cannot be terminated successfully or completed as planned, leading to a go-around, a balked landing or an unplanned manual intervention by the pilot during the landing manoeuvre.

(c) Possible causes may be human-factor-related issues when employing newly introduced LVO equipment technologies or procedures or when changes take place in the runway environment or aerodrome vicinity.

The following AMC1 ORO.DEC.100(a); (d) is inserted:

AMC1 ORO.DEC.100(a); (d) Declaration

RELEVANT INFORMATION PRIOR TO COMMENCING OPERATION, AND NOTIFICATION OF ANY CHANGES TO DECLARATION — EFVS 200 OPERATIONS

Declarations involving EFVS 200 operations (under NCC.OP.235 or SPO.OP.235) should be submitted at least 60 days before the new declaration or any change becomes effective, and indicate the date as of which they would apply.

The following GM1 ORO.DEC.100(a); (d) is inserted:

GM1 ORO.DEC.100(a);(d) Declaration

RELEVANT INFORMATION PRIOR TO COMMENCING OPERATION, AND NOTIFICATION OF ANY CHANGES TO DECLARATION — EFVS 200 OPERATIONS

(a) When a declaration involves EFVS 200 operations in accordance with NCC.OP.235 or SPO.OP.235, the CAA should be enabled to fulfil its responsibilities in accordance with ARO.GEN.345 prior to starting these operations or implementing changes to such EFVS 200 operations.

(b) In accordance with ORO.DEC.100 points (a) and (d), the operator shall provide all relevant information and notify any changes. In relation to EFVS 200, this may be but is not limited to:

(1) AFM or additional data from the TC/STC holder;

(2) established relevant aerodrome operating minima;

(3) documented operating procedures;

(4) training and checking programmes;

(5) minimum equipment list (MEL) for the operations to be undertaken; and

(6) processes to ensure that only runways and instrument procedures suitable for the intended operations are used.

AMC3 ORO.MLR.100 is replaced by the following:

AMC3 ORO.MLR.100 Operations manual – general

CONTENTS — CAT OPERATIONS

(a) The OM should contain at least the following information, where applicable, as relevant for the area and type of operation:

A GENERAL/BASIC

0 ADMINISTRATION AND CONTROL OF THE OPERATIONS MANUAL

0.1 Introduction:

(a) A statement that the manual complies with all applicable regulations and with the terms and conditions of the applicable AOC.

(b) A statement that the manual contains operational instructions that are to be complied with by the relevant personnel.

(c) A list and brief description of the various parts, their contents, applicability and use.

(d) Explanations and definitions of terms and words needed for the use of the manual.

0.2 System of amendment and revision:

(a) Details of the person(s) responsible for the issuance and insertion of amendments and revisions.

(b) A record of amendments and revisions with insertion dates and effective dates.

(c) A statement that handwritten amendments and revisions are not permitted, except in situations requiring immediate amendment or revision in the interest of safety.

(d) A description of the system for the annotation of pages or paragraphs and their effective dates.

(e) A list of effective pages or paragraphs.

(f) Annotation of changes (in the text and, as far as practicable, on charts and diagrams).

(g) Temporary revisions.

(h) A description of the distribution system for the manuals, amendments and revisions.

1 ORGANISATION AND RESPONSIBILITIES

1.1 Organisational structure. A description of the organisational structure, including the general organogram and operations departments' organograms. The organogram should depict the relationship between the operations departments and the other departments of the operator. In particular, the subordination and reporting lines of all divisions, departments, etc., which pertain to the safety of flight operations, should be shown.

1.2 Nominated persons. The name of each nominated person responsible for flight operations, crew training and ground operations, as prescribed in **ORO.AOC.135**. A description of their function and responsibilities should be included.

1.3 Responsibilities and duties of operations management personnel. A description of the duties, responsibilities and authority of operations management personnel pertaining to the safety of flight operations and the compliance with the applicable regulations.

1.4 Authority, duties and responsibilities of the pilot-in-command/commander. A statement defining the authority, duties and responsibilities of the pilot-in-command/commander.

1.5 Duties and responsibilities of crew members other than the pilot-in-command/commander.

2 OPERATIONAL CONTROL AND SUPERVISION

2.1 Supervision of the operation by the operator. A description of the system for supervision of the operation by the operator (see **ORO.GEN.110(c)**). This should show how the safety of flight operations and the qualifications of personnel are supervised. In particular, the procedures related to the following items should be described:

(a) licence and qualification validity,

(b) competence of operations personnel,

(c) control, analysis and storage of the required records.

2.2 System and responsibility for promulgation of additional operational instructions and information. A description of any system for promulgating information which may be of an operational nature, but which is supplementary to that in the OM. The applicability of this information and the responsibilities for its promulgation should be included.

2.3 Operational control. A description of the procedures and responsibilities necessary to exercise operational control with respect to flight safety.

2.4 Powers of the authority. A description of the powers of the CAA and guidance to staff on how to facilitate inspections by CAA personnel.

3 MANAGEMENT SYSTEM

A description of the management system, including at least the following:

(a) safety policy;

(b) the process for identifying safety hazards and for evaluating and managing the associated risks;

(c) compliance monitoring system;

(d) allocation of duties and responsibilities;

(e) documentation of all key management system processes.

4 CREW COMPOSITION

4.1 Crew composition. An explanation of the method for determining crew compositions, taking account of the following:

(a) the type of aircraft being used;

(b) the area and type of operation being undertaken;

(c) the phase of the flight;

(d) the minimum crew requirement and flight duty period planned;

(e) experience (total and on type), recency and qualification of the crew members;

(f) the designation of the pilot-in-command/commander and, if necessitated by the duration of the flight, the procedures for the relief of the pilot-in-command/commander or other members of the flight crew (see **ORO.FC.105**);

(g) the designation of the senior cabin crew member and, if necessitated by the duration of the flight, the procedures for the relief of the senior cabin crew member and any other member of the cabin crew.

4.2 Designation of the pilot-in-command/commander. The rules applicable to the designation of the pilot-in-command/commander.

4.3 Flight crew incapacitation. Instructions on the succession of command in the event of flight crew incapacitation.

4.4 Operation on more than one type. A statement indicating which aircraft are considered as one type for the purpose of:

(a) flight crew scheduling; and

(b) cabin crew scheduling.

5 QUALIFICATION REQUIREMENTS

5.1 A description of the required licence, rating(s), qualification/competency (e.g. for routes and aerodromes), experience, training, checking and recency for operations personnel to conduct their duties. Consideration should be given to the aircraft type, kind of operation and composition of the crew.

5.2 Flight crew:

(a) pilot-in-command/commander,

(b) pilot relieving the pilot-in-command/commander,

(c) co-pilot,

(d) pilot relieving the co-pilot,

(e) pilot under supervision,

(f) system panel operator,

(g) operation on more than one type or variant.

5.3 Cabin crew:

(a) senior cabin crew member,

(b) cabin crew member:

(i) required cabin crew member,

(ii) additional cabin crew member and cabin crew member during familiarisation flights,

(c) operation on more than one type or variant.

5.4 Training, checking and supervision personnel:

(a) for flight crew; and

(b) for cabin crew.

5.5 Other operations personnel (including technical crew and crew members other than flight, cabin and technical crew).

6 CREW HEALTH PRECAUTIONS

6.1 Crew health precautions. The relevant regulations and guidance to crew members concerning health, including the following:

(a) alcohol and other intoxicating liquids,

(b) narcotics,

(c) drugs,

(d) sleeping tablets,

(e) anti-depressants,

(f) pharmaceutical preparations,

(g) immunisation,

(h) deep-sea diving,

(i) blood/bone marrow donation,

(j) meal precautions prior to and during flight,

(k) sleep and rest,

(l) surgical operations.

7 FLIGHT TIME LIMITATIONS

7.1 Flight and duty time limitations and rest requirements.

7.2 Exceedance of flight and duty time limitations and/or reductions of rest periods. Conditions under which flight and duty time may be exceeded or rest periods may be reduced, and the procedures used to report these modifications.

7.3 A description of the fatigue risk management, including at least the following:

(a) the philosophy and principles;

(b) documentation of processes;

(c) scientific principles and knowledge;

(d) hazard identification and risk assessment processes;

(e) risk mitigation process;

(f) FRM safety assurance processes; and

(g) FRM promotion processes.

8 OPERATING PROCEDURES

8.1 Flight preparation instructions. As applicable to the operation:

8.1.1 Minimum flight altitudes. A description of the method of determination and application of minimum altitudes including:

(a) a procedure to establish the minimum altitudes/flight levels for visual flight rules (VFR) flights; and

(b) a procedure to establish the minimum altitudes/flight levels for instrument flight rules (IFR) flights.

8.1.2 Criteria and responsibilities for determining the adequacy of aerodromes to be used.

8.1.3 Methods and responsibilities for establishing aerodrome operating minima. Reference should be made to procedures for the determination of the visibility and/or runway visual range (RVR) and for the applicability of the actual visibility observed by the pilots, the reported visibility and the reported RVR.

8.1.4 En-route operating minima for VFR flights or VFR portions of a flight and, where single-engined aircraft are used, instructions for route selection with respect to the availability of surfaces that permit a safe forced landing.

8.1.5 Presentation and application of aerodrome and en-route operating minima.

8.1.6 Interpretation of meteorological information. Explanatory material on the decoding of meteorological (MET) forecasts and MET reports relevant to the area of operations, including the interpretation of conditional expressions.

8.1.7 Determination of the quantities of fuel, oil and water methanol carried. The methods by which the quantities of fuel, oil and water methanol to be carried are determined and monitored in-flight. This section should also include instructions on the measurement and distribution of the fluid carried on board. Such instructions should take account of all circumstances likely to be encountered on the flight, including the possibility of in-flight re-planning and of failure of one or more of the aircraft's power plants. The system for maintaining fuel and oil records should also be described.

8.1.8 Mass and centre of gravity. The general principles of mass and centre of gravity including the following:

(a) definitions;

(b) methods, procedures and responsibilities for preparation and acceptance of mass and centre of gravity calculations;

(c) the policy for using standard and/or actual masses;

(d) the method for determining the applicable passenger, baggage and cargo mass;

(e) the applicable passenger and baggage masses for various types of operations and aircraft type;

(f) general instructions and information necessary for verification of the various types of mass and balance documentation in use;

(g) last-minute changes procedures;

(h) specific gravity of fuel, oil and water methanol;

(i) seating policy/procedures;

(j) for helicopter operations, standard load plans.

8.1.9 Air traffic services (ATS) flight plan. Procedures and responsibilities for the preparation and submission of the ATS flight plan. Factors to be considered include the means of submission for both individual and repetitive flight plans.

8.1.10 Operational flight plan. Procedures and responsibilities for the preparation and acceptance of the operational flight plan. The use of the operational flight plan should be described, including samples of the operational flight plan formats in use.

8.1.11 Operator's aircraft technical log. The responsibilities and the use of the operator's aircraft technical log should be described, including samples of the format used.

8.1.12 List of documents, forms and additional information to be carried.

8.1.13 For commercial air transport operations with single-engined turbine aeroplanes in instrument meteorological conditions or at night (CAT SET-IMC) approved in accordance with Subpart L (SET-IMC) of Annex V (Part-SPA) to UK Regulation (EU) No 965/2012:

(a) the procedure for route selection with respect to the availability of surfaces, which permits a safe forced landing;

(b) the instructions for the assessment of landing sites (elevation, landing direction, and obstacles in the area); and

(c) the instructions for the assessment of the weather conditions at those landing sites.

8.2 Ground handling instructions. As applicable to the operation:

8.2.1 Fuelling procedures. A description of fuelling procedures, including:

(a) safety precautions during refuelling and defuelling including when an aircraft auxiliary power unit is in operation or, for helicopters, when rotors are ~~running~~ turning or, for aeroplanes, when an engine is ~~or engines are~~ running ~~and the prop-brakes are on~~;

(b) refuelling and defuelling when passengers are embarking, on board or disembarking; and

(c) precautions to be taken to avoid mixing fuels.

8.2.2 Aircraft, passengers and cargo handling procedures related to safety. A description of the handling procedures to be used when allocating seats, embarking and disembarking passengers and when loading and unloading the aircraft. Further procedures, aimed at achieving safety whilst the aircraft is on the ramp, should also be given. Handling procedures should include:

(a) special categories of passengers, including children/infants, persons with reduced mobility, inadmissible passengers, deportees and persons in custody;

(b) permissible size and weight of hand baggage;

(c) loading and securing of items in the aircraft;

(d) positioning of ground equipment;

(e) operation of aircraft doors;

(f) safety on the aerodrome/operating site, including fire prevention and safety in blast and suction areas;

(g) start-up, ramp departure and arrival procedures, including, for aeroplanes, push-back and towing operations;

(h) servicing of aircraft;

(i) documents and forms for aircraft handling;

(j) special loads and classification of load compartments; and

(k) multiple occupancy of aircraft seats.

8.2.3 Procedures for the refusal of embarkation. Procedures to ensure that persons who appear to be intoxicated, or who demonstrate by manner or physical indications that they are under the influence of drugs, are refused embarkation. This does not apply to medical patients under proper care.

8.2.4 De-icing and anti-icing on the ground. A description of the de-icing and anti-icing policy and procedures for aircraft on the ground. These should include descriptions of the types and effects of icing and other contaminants on aircraft whilst stationary, during ground movements and during take-off. In addition, a description of the fluid types used should be given, including the following:

(a) proprietary or commercial names,

(b) characteristics,

(c) effects on aircraft performance,

(d) hold-over times,

(e) precautions during usage.

8.3 Flight Procedures:

8.3.1 VFR/IFR Policy. A description of the policy for allowing flights to be made under VFR, or for requiring flights to be made under IFR, or for changing from one to the other.

8.3.2 Navigation Procedures. A description of all navigation procedures, relevant to the type(s) and area(s) of operation. Special consideration should be given to:

(a) standard navigational procedures, including policy for carrying out independent cross-checks of keyboard entries where these affect the flight path to be followed by the aircraft; and

(b) required navigation performance (RNP), minimum navigation performance specification (MNPS) and polar navigation and navigation in other designated areas;

(c) in-flight re-planning;

(d) procedures in the event of system degradation; and

(e) reduced vertical separation minima (RVSM), for aeroplanes.

8.3.3 Altimeter setting procedures, including, where appropriate, use of:

(a) metric altimetry and conversion tables; and

(b) QFE operating procedures.

8.3.4 Altitude alerting system procedures for aeroplanes or audio voice alerting devices for helicopters.

8.3.5 Ground proximity warning system (GPWS)/terrain avoidance warning system (TAWS), for aeroplanes. Procedures and instructions required for the avoidance of controlled flight into terrain, including limitations on high rate of descent near the surface (the related training requirements are covered in OM-D 2.1).

8.3.6 Policy and procedures for the use of traffic collision avoidance system (TCAS)/airborne collision avoidance system (ACAS) for aeroplanes and, when applicable, for helicopters.

8.3.7 Policy and procedures for in-flight fuel management.

8.3.8 Adverse and potentially hazardous atmospheric conditions. Procedures for operating in, and/or avoiding, adverse and potentially hazardous atmospheric conditions, including the following:

(a) thunderstorms,

(b) icing conditions,

(c) turbulence,

(d) windshear,

(e) jet stream,

(f) volcanic ash clouds,

(g) heavy precipitation,

(h) sand storms,

(i) mountain waves,

(j) significant temperature inversions.

8.3.9 Wake turbulence. Wake turbulence separation criteria, taking into account aircraft types, wind conditions and runway/final approach and take-off area (FATO) location. For helicopters, consideration should also be given to rotor downwash.

8.3.10 Crew members at their stations. The requirements for crew members to occupy their assigned stations or seats during the different phases of flight or whenever deemed necessary in the interest of safety and, for aeroplane operations, including procedures for controlled rest in the flight crew compartment.

8.3.11 Use of restraint devices for crew and passengers. The requirements for crew members and passengers to use safety belts and/or restraint systems during the different phases of flight or whenever deemed necessary in the interest of safety.

8.3.12 Admission to flight crew compartment. The conditions for the admission to the flight crew compartment of persons other than the flight crew. The policy regarding the admission of inspectors from an authority should also be included.

8.3.13 Use of vacant crew seats. The conditions and procedures for the use of vacant crew seats.

8.3.14 Incapacitation of crew members. Procedures to be followed in the event of incapacitation of crew members in-flight. Examples of the types of incapacitation and the means for recognising them should be included.

8.3.15 Cabin safety requirements. Procedures:

(a) covering cabin preparation for flight, in-flight requirements and preparation for landing, including procedures for securing the cabin and galleys;

(b) to ensure that passengers are seated where, in the event that an emergency evacuation is required, they may best assist and not hinder evacuation from the aircraft;

(c) to be followed during passenger embarkation and disembarkation;

(d) when refuelling/defuelling with passengers embarking, on board or disembarking;

(e) covering the carriage of special categories of passengers;

(f) covering smoking on board;

(g) covering the handling of suspected infectious diseases.

8.3.16 Passenger briefing procedures. The contents, means and timing of passenger briefing in accordance with Annex IV (Part-CAT).

8.3.17 Procedures for aircraft operated whenever required cosmic or solar radiation detection equipment is carried.

8.3.18 Policy on the use of autopilot and autothrottle for aircraft fitted with these systems.

8.4 Low visibility operations (LVO). A description of the operational procedures associated with LVO.

8.5 Extended-range operations with two-engined aeroplanes (ETOPS). A description of the ETOPS operational procedures. (Refer to EASA AMC 20-6)

8.6 Use of the minimum equipment and configuration deviation list(s).

8.7 Non-commercial operations. Information as required by **ORO.AOC.125** for each type of non-commercial flight performed by the AOC holder. A description of the differences from CAT operations. Procedures and limitations, for example, for the following:

(a) training flights,

(b) flights at the end of lease or upon transfer of ownership,

(c) delivery flights,

(d) ferry flights,

(e) demonstration flights,

(f) positioning flights,

(g) other non-commercial flights.

8.8 Oxygen requirements:

8.8.1 An explanation of the conditions under which oxygen should be provided and used.

8.8.2 The oxygen requirements specified for the following persons:

(a) flight crew;

(b) cabin crew;

(c) passengers.

8.9 Procedures related to the use of type B EFB applications.

9 DANGEROUS GOODS AND WEAPONS

9.1 Information, instructions and general guidance on the transport of dangerous goods, in accordance with Subpart G of Annex V (SPA.DG), including:

(a) operator’s policy on the transport of dangerous goods;

(b) guidance on the requirements for acceptance, labelling, handling, stowage and segregation of dangerous goods;

(c) special notification requirements in the event of an accident or occurrence when dangerous goods are being carried;

(d) procedures for responding to emergency situations involving dangerous goods;

(e) duties of all personnel involved; and

(f) instructions on the carriage of the operator's personnel on cargo aircraft when dangerous goods are being carried.

9.2 The conditions under which weapons, munitions of war and sporting weapons may be carried.

10 SECURITY

Security instructions, guidance, procedures, training and responsibilities, taking into account Regulation (EC) No 300/2008. Some parts of the security instructions and guidance may be kept confidential.

11 HANDLING, NOTIFYING AND REPORTING ACCIDENTS, INCIDENTS AND OCCURRENCES AND USING THE CVR RECORDING

Procedures for handling, notifying and reporting accidents, incidents and occurrences. This section should include the following:

(a) definition of accident, incident and occurrence and of the relevant responsibilities of all persons involved;

(b) illustrations of forms to be used for reporting all types of accident, incident and occurrence (or copies of the forms themselves), instructions on how they are to be completed, the addresses to which they should be sent and the time allowed for this to be done;

(c) in the event of an accident, descriptions of which departments, authorities and other organisations have to be notified, how this will be done and in what sequence;

(d) procedures for verbal notification to air traffic service units of incidents involving ACAS resolution advisories (RAs), bird hazards, dangerous goods and hazardous conditions;

(e) procedures for submitting written reports on air traffic incidents, ACAS RAs, bird strikes, dangerous goods incidents or accidents, and unlawful interference;

(f) reporting procedures. These procedures should include internal safety-related reporting procedures to be followed by crew members, designed to ensure that the pilot-in-command/commander is informed immediately of any incident that has endangered, or may have endangered, safety during the flight, and that the pilot-in-command/commander is provided with all relevant information.

(g) Procedures for the preservation of recordings of the flight recorders following an accident or a serious incident or when so directed by the investigating authority. These procedures should include:

(1) a full quotation of point (a) of **CAT.GEN.MPA.195**; and

(2) instructions and means to prevent inadvertent reactivation, repair or reinstallation of the flight recorders by personnel of the operator or of third parties, and to ensure that flight recorder recordings are preserved for the needs of the investigating authority.

(h) Procedures required by **CAT.GEN.MPA.195** for using the CVR recording or its transcript without prejudice to Regulation (EU) No 996/210, when applicable.

12 RULES OF THE AIR

(a) Visual and instrument flight rules,

(b) Territorial application of the rules of the air,

(c) Communication procedures, including communication-failure procedures,

(d) Information and instructions relating to the interception of civil aircraft,

(e) The circumstances in which a radio listening watch is to be maintained,

(f) Signals,

(g) Time system used in operation,

(h) ATC clearances, adherence to flight plan and position reports,

(i) Visual signals used to warn an unauthorised aircraft flying in or about to enter a restricted, prohibited or danger area,

(j) Procedures for flight crew observing an accident or receiving a distress transmission,

(k) The ground/air visual codes for use by survivors, and description and use of signal aids,

(l) Distress and urgency signals.

13 LEASING/CODE-SHARE

A description of the operational arrangements for leasing and code-share, associated procedures and management responsibilities.

B AIRCRAFT OPERATING MATTERS — TYPE RELATED

Taking account of the differences between types/classes, and variants of types, under the following headings:

0 GENERAL INFORMATION AND UNITS OF MEASUREMENT

0.1 General information (e.g. aircraft dimensions), including a description of the units of measurement used for the operation of the aircraft type concerned and conversion tables.

1 LIMITATIONS

1.1 A description of the certified limitations and the applicable operational limitations should include the following:

(a) certification status (e.g. EASA (supplemental) type certificate, environmental certification, etc.);

(b) passenger seating configuration for each aircraft type, including a pictorial presentation;

(c) types of operation that are approved (e.g. VFR/IFR, CAT II/III, RNP, flights in known icing conditions, etc.);

(d) crew composition;

(e) mass and centre of gravity;

(f) speed limitations;

(g) flight envelope(s);

(h) wind limits, including operations on contaminated runways;

(i) performance limitations for applicable configurations;

(j) (runway) slope;

(k) for aeroplanes, limitations on wet or contaminated runways;

(l) airframe contamination;

(m) system limitations.

2 NORMAL PROCEDURES

The normal procedures and duties assigned to the crew, the appropriate checklists, the system for their use and a statement covering the necessary coordination procedures between flight and cabin/other crew members. The normal procedures and duties should include the following:

(a) pre-flight,

(b) pre-departure,

(c) altimeter setting and checking,

(d) taxi, take-off and climb,

(e) noise abatement,

(f) cruise and descent,

(g) approach, landing preparation and briefing,

(h) VFR approach,

(i) IFR approach,

(j) visual approach and circling,

(k) missed approach,

(l) normal landing,

(m) post-landing,

(n) for aeroplanes, operations on wet and contaminated runways.

3 ABNORMAL AND/OR EMERGENCY PROCEDURES

The abnormal and/or emergency procedures and duties assigned to the crew, the appropriate checklists, the system for their use and a statement covering the necessary coordination procedures between flight and cabin/other crew members. The abnormal and/or emergency procedures and duties should include the following:

(a) crew incapacitation,

(b) fire and smoke drills,

(c) for aeroplanes, un-pressurised and partially pressurised flight,

(d) for aeroplanes, exceeding structural limits such as overweight landing,

(e) lightning strikes,

(f) distress communications and alerting ATC to emergencies,

(g) engine/burner failure,

(h) system failures,

(i) guidance for diversion in case of serious technical failure,

(j) ground proximity warning, including for helicopters audio voice alerting device (AVAD) warning,

(k) ACAS/TCAS warning for aeroplanes/audio voice alerting device (AVAD) warning for helicopters,

(l) windshear,

(m) emergency landing/ditching,

(n) for aeroplanes, departure contingency procedures.

4 PERFORMANCE

4.0 Performance data should be provided in a form that can be used without difficulty.

4.1 Performance data. Performance material that provides the necessary data for compliance with the performance requirements prescribed in Annex IV (Part-CAT). For aeroplanes, this performance data should be included to allow the determination of the following:

(a) take-off climb limits — mass, altitude, temperature;

(b) take-off field length (for dry, wet and contaminated runway conditions);

(c) net flight path data for obstacle clearance calculation or, where applicable, take-off flight path;

(d) the gradient losses for banked climb-outs;

(e) en-route climb limits;

(f) approach climb limits;

(g) landing climb limits;

(h) landing field length (for dry, wet and contaminated runway conditions) including the effects of an in-flight failure of a system or device, if it affects the landing distance;

(i) brake energy limits;

(j) speeds applicable for the various flight stages (also considering dry, wet and contaminated runway conditions).

4.1.1 Supplementary data covering flights in icing conditions. Any certified performance related to an allowable configuration, or configuration deviation, such as anti-skid inoperative.

4.1.2 If performance data, as required for the appropriate performance class, are not available in the AFM, then other data should be included. The OM may contain cross-reference to the data contained in the AFM where such data are not likely to be used often or in an emergency.

4.2 Additional performance data for aeroplanes. Additional performance data, where applicable, including the following:

(a) all engine climb gradients,

(b) drift-down data,

(c) effect of de-icing/anti-icing fluids,

(d) flight with landing gear down,

(e) for aircraft with 3 or more engines, one-engine-inoperative ferry flights,

(f) flights conducted under the provisions of the configuration deviation list (CDL).

5 FLIGHT PLANNING

5.1 Data and instructions necessary for pre-flight and in-flight planning including, for aeroplanes, factors such as speed schedules and power settings. Where applicable, procedures for engine(s)-out operations, ETOPS (particularly the one-engine-inoperative cruise speed and maximum distance to an adequate aerodrome determined in accordance with Annex IV (Part-CAT)) and flights to isolated aerodromes should be included.

5.2 The method for calculating fuel needed for the various stages of flight.

5.3 When applicable, for aeroplanes, performance data for ETOPS critical fuel reserve and area of operation, including sufficient data to support the critical fuel reserve and area of operation calculation based on approved aircraft performance data. The following data should be included:

(a) detailed engine(s)-inoperative performance data, including fuel flow for standard and non-standard atmospheric conditions and as a function of airspeed and power setting, where appropriate, covering:

(i) drift down (includes net performance), where applicable;

(ii) cruise altitude coverage including 10 000 ft;

(iii) holding;

(iv) altitude capability (includes net performance); and

(v) missed approach;

(b) detailed all-engine-operating performance data, including nominal fuel flow data, for standard and non-standard atmospheric conditions and as a function of airspeed and power setting, where appropriate, covering:

(i) cruise (altitude coverage including 10 000 ft); and

(ii) holding;

(c) details of any other conditions relevant to ETOPS operations which can cause significant deterioration of performance, such as ice accumulation on the unprotected surfaces of the aircraft, ram air turbine (RAT) deployment, thrust-reverser deployment, etc.; and

(d) the altitudes, airspeeds, thrust settings, and fuel flow used in establishing the ETOPS area of operations for each airframe-engine combination should be used in showing the corresponding terrain and obstruction clearances in accordance with Annex IV (Part-CAT).

6 MASS AND BALANCE

Instructions and data for the calculation of the mass and balance, including the following:

(a) calculation system (e.g. index system);

(b) information and instructions for completion of mass and balance documentation, including manual and computer generated types;

(c) limiting masses and centre of gravity for the types, variants or individual aircraft used by the operator;

(d) dry operating mass and corresponding centre of gravity or index.

7 LOADING

Procedures and provisions for loading and unloading and securing the load in the aircraft.

8 CONFIGURATION DEVIATION LIST

The CDL(s), if provided by the manufacturer, taking account of the aircraft types and variants operated, including procedures to be followed when an aircraft is being dispatched under the terms of its CDL.

9 MINIMUM EQUIPMENT LIST (MEL)

The MEL for each aircraft type or variant operated and the type(s)/area(s) of operation. The MEL should also include the dispatch conditions associated with operations required for a specific approval (e.g. RNAV, RNP, RVSM, ETOPS). Consideration should be given to using the ATA number system when allocating chapters and numbers.

10 SURVIVAL AND EMERGENCY EQUIPMENT INCLUDING OXYGEN

10.1 A list of the survival equipment to be carried for the routes to be flown and the procedures for checking the serviceability of this equipment prior to take-off. Instructions regarding the location, accessibility and use of survival and emergency equipment and its associated checklist(s) should also be included.

10.2 The procedure for determining the amount of oxygen required and the quantity that is available. The flight profile, number of occupants and possible cabin decompression should be considered.

11 EMERGENCY EVACUATION PROCEDURES

11.1 Instructions for preparation for emergency evacuation, including crew coordination and emergency station assignment.

11.2 Emergency evacuation procedures. A description of the duties of all members of the crew for the rapid evacuation of an aircraft and the handling of the passengers in the event of a forced landing, ditching or other emergency.

12 AIRCRAFT SYSTEMS

A description of the aircraft systems, related controls and indications and operating instructions. Consideration should be given to use the ATA number system when allocating chapters and numbers.

C ROUTE/ROLE/AREA AND AERODROME/OPERATING SITE INSTRUCTIONS AND INFORMATION

1 Instructions and information relating to communications, navigation and aerodromes/operating sites, including minimum flight levels and altitudes for each route to be flown and operating minima for each aerodrome/operating site planned to be used, including the following:

(a) minimum flight level/altitude;

(b) operating minima for departure, destination and alternate aerodromes;

(c) communication facilities and navigation aids;

(d) runway/final approach and take-off area (FATO) data and aerodrome/operating site facilities;

(e) approach, missed approach and departure procedures including noise abatement procedures;

(f) communication-failure procedures;

(g) search and rescue facilities in the area over which the aircraft is to be flown;

(h) a description of the aeronautical charts that should be carried on board in relation to the type of flight and the route to be flown, including the method to check their validity;

(i) availability of aeronautical information and MET services;

(j) en-route communication/navigation procedures;

(k) aerodrome/operating site categorisation for flight crew competence qualification;

(l) special aerodrome/operating site limitations (performance limitations and operating procedures, etc.).

(2) Information related to landing sites available for operations approved in accordance with Subpart L (SET-IMC) of Annex V (Part-SPA) to Regulation (EU) No 965/2012, including:

(a) a description of the landing site (position, surface, slope, elevation, etc.);

(b) the preferred landing direction; and

(c) obstacles in the area.

D TRAINING

1 Description of scope: Training syllabi and checking programmes for all operations personnel assigned to operational duties in connection with the preparation and/or conduct of a flight.

2 Content: Training syllabi and checking programmes should include the following:

2.1 for flight crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-SPA) and ORO.FC;

2.2 for cabin crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-CC) of ~~Commission Regulation~~ **UK Regulation (EU) 1178/2011** and ORO.CC;

2.3 for technical crew, all relevant items prescribed in Annex IV (Part-CAT), Annex V (Part-SPA) and ORO.TC;

2.4 for operations personnel concerned, including crew members:

(a) all relevant items prescribed in SPA.DG Subpart G of Annex IV (SPA.DG); and

(b) all relevant items prescribed in Annex IV (Part-CAT) and ORO.SEC; and

2.5 for operations personnel other than crew members (e.g. dispatcher, handling personnel, etc.), all other relevant items prescribed in Annex IV (Part-CAT) and in this Annex pertaining to their duties.

3 Procedures:

3.1 Procedures for training and checking.

3.2 Procedures to be applied in the event that personnel do not achieve or maintain the required standards.

3.3 Procedures to ensure that abnormal or emergency situations requiring the application of part or all of the abnormal or emergency procedures, and simulation of instrument meteorological conditions (IMC) by artificial means are not simulated during CAT operations.

4 Description of documentation to be stored and storage periods.

(b) Notwithstanding (a), an OM that is compiled in accordance with JAR-OPS 3 amendment 5 may be considered to be compliant.

(c) If there are sections that, because of the nature of the operation, do not apply, it is recommended that operators maintain the numbering system described in **ORO.MLR.101** and above and insert ‘Not applicable’ or ‘Intentionally blank’ where appropriate.

Annex IV – Part - CAT

Annex IV is amended as follows:

The following GM1 CAT.OP.MPA.101(b) is inserted:

GM1 CAT.GEN.MPA.101(b) Altimeter check and settings

ALTIMETER SETTING PROCEDURES

The following paragraphs of ICAO Doc 8168 (PANS-OPS), Volume III provide recommended guidance on how to develop the altimeter setting procedure:

(a) 3.2 'Pre-flight operational test';

(b) 3.3 'Take-off and climb';

(c) 3.5 'Approach and landing'.

The following AMC1 CAT.GEN.MPA.180(a)(18) is inserted:

AMC1 CAT.GEN.MPA.180(a)(18) Documents, manuals and information to be carried

APPROPRIATE METEOROLOGICAL INFORMATION

The appropriate meteorological information should be relevant to the planned operation, as specified in point (a) of point MET.TR.215 of Annex V (Part-MET) to UK Regulation (EU) 2017/373, and comprise the following:

(a) the meteorological information that is specified in point (e) of point MET.TR.215 of Part-MET; and

(b) supplemental meteorological information:

(1) information other than that specified in point (a), which should be based on data from certified meteorological service providers; or

(2) information from other reliable sources of meteorological information that should be evaluated by the operator.

The following GM1 CAT.GEN.MPA.180(a)(18) is inserted:

GM1 CAT.GEN.MPA.180(a)(18) Documents, manuals and information to be carried

DATA FROM CERTIFIED METEOROLOGICAL SERVICE PROVIDERS

In the context of point (b)(1) of AMC1 CAT.GEN.MPA.180(a)(18), the operator may consider that any meteorological information that is provided by the organisation within the scope of the meteorological information included in the flight documentation defined in point (e) of point MET.TR.215 of Part-MET should originate only from authoritative sources or certified providers, and should not be transformed or tampered, except for the purpose of presenting the data in the correct format. The organisation's process should provide assurance that the integrity of such service is preserved in the data to be used by both flight crews and operators, regardless of their form.

The following GM2 CAT.GEN.MPA.180(a)(18) is inserted:

GM2 CAT.GEN.MPA.180(a)(18) Documents, manuals and information to be carried

INFORMATION FROM OTHER RELIABLE SOURCES OF METEOROLOGICAL INFORMATION

In the context of point (b)(2) of AMC1 CAT.GEN.MPA.180(a)(18), reliable sources of meteorological information are organisations that are able to provide an appropriate level of data assurance in terms of accuracy and integrity. The operator may consider in the evaluation that the organisation has a quality assurance system in place that covers source selection, acquisition/import, processing, validity period check, and distribution phase of data.

The following GM3 CAT.GEN.MPA.180(a)(18) is inserted:

GM3 CAT.GEN.MPA.180(a)(18) Documents, manuals and information to be carried

SUPPLEMENTAL METEOROLOGICAL INFORMATION AND SUPPLEMENTAL INFORMATION

Supplemental meteorological information: when operating under specific provisions and without the meteorological information from a certified service provider, the operator should use ‘supplemental meteorological information’, such as digital imagery. Related information can be found in point (e)(4) of AMC1 CAT.OP.MPA.192.

Supplementary information: it is included in point (a) of AMC1 CAT.GEN.MPA.180(a)(18) and refers to meteorological information to be reported in specific cases such as freezing precipitation, blowing snow, thunderstorm, etc.

GM1 CAT.OP.MPA.107 is replaced by the following:

GM1 CAT.OP.MPA.107 Adequate aerodrome

VERIFICATION OF WEATHER CONDITIONS

~~**RESCUE AND FIREFIGHTING SERVICES (RFFS)**~~

~~Guidance on the assessment of the level of an aerodrome’s RFFS may be found in Attachment I to ICAO Annex 6 Part I.~~

This GM clarifies the difference between ‘adequate aerodrome’ and ‘weather-permissible aerodrome’. The two concepts are complementary:

— ‘adequate aerodrome’: see definition in Annex I (Definitions for terms used in Annexes II to VIII) and point **CAT.OP.MPA.107** of Annex IV (Part-CAT) to **UK Regulation (EU) No 965/2012;** and

— 'weather-permissible aerodrome' means an adequate aerodrome with additional requirements: see definition in Annex I (Definitions for terms used in Annexes II to VIII).

Weather conditions are not required to be considered at an adequate aerodrome.

AMC1 CAT.OP.MPA.110 is replaced by the following:

AMC1 CAT.OP.MPA.110 Aerodrome operating minima

TAKE-OFF OPERATIONS — AEROPLANES

(a) ~~General~~ Take-off minima

~~(1)~~ Take-off minima should be expressed as visibility (VIS) or runway visual range (RVR) limits, taking into account all relevant factors for each ~~aerodrome~~ runway planned to be used and aircraft characteristics and equipment. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions, e.g. ceiling, should be specified.

~~(2) The commander should not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than applicable minima for landing at that aerodrome unless a weather-permissible take-off alternate aerodrome is available.~~

~~(3) When the reported meteorological visibility (VIS) is below that required for take-off and RVR is not reported, a take-off should only be commenced if the commander can determine that the visibility along the take-off runway is equal to or better than the required minimum.~~

~~(4) When no reported meteorological visibility or RVR is available, a take-off should only be commenced if the commander can determine that the visibility along the take-off runway is equal to or better than the required minimum.~~

(b) Visual reference

(1) The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and a continued take-off after failure of the critical engine.

(2) For night operations, ~~ground~~ the prescribed runway lights should be ~~available to illuminate~~ in operation ~~the runway and any obstacles~~.

(c) Required RVR~~/~~ or VIS~~— aeroplanes~~

(1) For multi-engined aeroplanes, with performance such that, in the event of a critical engine failure at any point during take-off, the aeroplane can either stop or continue the take-off to a height of 1 500 ft above the aerodrome while clearing obstacles by the required margins, the take-off minima specified by the operator should be expressed as RVR~~/CMV (converted meteorological visibility)~~ or VIS values not lower than those specified in Table 1~~.A~~.

(2) For multi-engined aeroplanes without the performance to comply with the conditions in (c)(1), in the event of a critical engine failure, there may be a need to re-land immediately and to see and avoid obstacles in the take-off area. Such aeroplanes may be operated to the following take-off minima provided that they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the height specified. The take-off minima specified by the operator should be based upon the height from which the one-engine-inoperative (OEI) net take-off flight path can be constructed. The RVR minima used should not be lower than either of the values specified in Table 1~~.A~~ or Table 2~~.A~~.

(3) For single-engined turbine aeroplane operations approved in accordance with Subpart L (SET-IMC) of Annex V (Part-SPA) to Regulation (EU) No 965/2012, the take-off minima specified by the operator should be expressed as RVR/CMV values not lower than those specified in Table 1.A below.

Unless the operator is making use of a risk period, whenever the surface in front of the runway does not allow for a safe forced landing, the RVR/CMV values should not be lower than 800 m. In this case, the proportion of the flight to be considered starts at the lift-off position and ends when the aeroplane is able to turn back and land on the runway in the opposite direction or glide to the next landing site in case of power loss.

(4) When RVR or VIS meteorological visibility is not available, the commander should not commence take-off unless he/ or she can determine that the actual conditions satisfy the applicable take-off minima.

Table 1.A

Take-off — aeroplanes (without an approval for low-visibility take-off (LVTO approval))

RVR/ or VIS

Facilities	**RVR/ or VIS (m) ***
Day only: Nil**	500
Day: at least runway edge lights or runway centreline markings Night: at least runway edge lights and runway end lights or runway centreline lights and runway end lights	400

Minimum RVR* or VIS*	Facilities
500 m (day)	Nil**
400 m (day)	Centre line markings or Runway edge lights or Runway centre line lights
400 m (night)	Runway end lights*** and Runway edge lights or runway centreline lights

*: The reported RVR/ or VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

**: The pilot is able to continuously identify the take-off surface and maintain directional control.

***: Runway end lights may be substituted by colour-coded runway edge lights or colour-coded runway centre line lights.

Table 2.A

Take-off — aeroplanes (without LVTO approval)

Assumed engine failure height above the runway versus RVR/ or VIS

Assumed engine failure height above the take-off runway (ft)	**RVR/ or VIS (m)****
<50	400 (200 with LVTO approval)

51–100	400 (200 with LVTO approval)
101–150	400
151–200	500
201–300	1 000
>300 *or if no positive take-off flight path can be constructed	1 500

*: 1 500m is also applicable if no positive take-off flight path can be constructed.

** The reported RVR/ or VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

AMC2 CAT.OP.MPA.110 is replaced by the following:

AMC2 CAT.OP.MPA.110 Aerodrome operating minima

TAKE-OFF OPERATIONS — HELICOPTERS

(a) General

(1) Take-off minima should be expressed as visibility VIS or runway visual range (RVR) limits, taking into account all relevant factors for each aerodrome or operating site planned to be used and aircraft characteristics and equipment. Where there is a specific need to see and avoid obstacles on departure, and/or or for a forced landing, additional conditions, e.g. ceiling, should be specified.

(2) The commander should not commence take-off unless the weather meteorological conditions at the aerodrome or operating site of departure are equal to or better than the applicable minima for landing at that aerodrome or operating site unless a weather-permissible take-off alternate aerodrome is available.

(3) When the reported meteorological visibility (VIS) is below that required for take-off and the RVR is not reported, a take-off should only be commenced if the commander can determine that the visibility or RVR along the take-off runway/area is equal to or better than the required minimum.

(4) When no reported meteorological visibility VIS or RVR is available, a take-off should only be commenced if the commander can determine that the visibility along the take-off runway/area is equal to or better than the required minimum.

(b) Visual reference

(1) The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and a continued take-off after failure of the critical engine.

(2) For night operations, ground lights should be available to illuminate the take-off runway/final approach and take-off area (FATO) and any obstacles.

(3) For point-in-space (PinS) departures to an initial departure fix (IDF), the take-off minima should be selected to ensure sufficient guidance to see and avoid obstacles and return to the heliport if the flight cannot be continued visually to the IDF. This should require a VIS of 800 m. The ceiling should be 250 ft.

(c) Required RVR/ or VIS — helicopters:

(1) For performance class 1 operations, the operator should specify an RVR/ or a VIS as take-off minima in accordance with Table 31.H.

(2) For performance class 2 operations onshore, the commander should operate to take-off minima of 800 m RVR/ or VIS and remain clear of cloud during the take-off manoeuvre until reaching performance class 1 capabilities.

(3) For performance class 2 operations offshore, the commander should operate to minima not less than ~~that~~ those for performance class 1 and remain clear of cloud during the take-off manoeuvre until reaching performance class 1 capabilities.

~~(4) Table 8 for converting reported meteorological visibility to RVR should not be used for calculating take-off minima.~~

Table 31.H

Take-off — helicopters (without LVTO approval)

RVR or /VIS

Onshore aerodromes with instrument flight rules (IFR) departure procedures	**RVR or /VIS (m) ****
No light and no markings (day only)	400 or the rejected take-off distance, whichever is the greater
No markings (night)	800
Runway edge/FATO light and ~~centreline~~ centre line marking	400
Runway edge/FATO light, ~~centreline~~ centre line marking and relevant RVR information	400
Offshore helideck *	
Two-pilot operations	400
Single-pilot operations	500

* The take-off flight path to be free of obstacles.

** On PinS departures to IDF, VIS should not be less than 800 m and the ceiling should not be less than 250 ft.

AMC3 CAT.OP.MPA.110 is replaced by the following:

AMC3 CAT.OP.MPA.110 Aerodrome operating minima

~~**NPA, APV, CAT I OPERATIONS**~~

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The decision height (DH) to be used for a ~~non-precision approach (NPA)~~ 3D approach operation or a 2D approach operation flown using ~~with~~ the continuous descent final approach (CDFA) technique~~, approach procedure with vertical guidance (APV) or category (CAT) I operation~~ should not be lower than the highest of:

~~(1) the minimum height to which the approach aid can be used without the required visual reference;~~

(1~~2~~) the obstacle clearance height (OCH) for the category of aircraft;

(23) the published approach procedure DH or minimum descent height (MDH) where applicable;

(34) the system minimaum specified in Table 43; or

(4) the minimum DH permitted for the runway specified in Table 5; or

(5) the minimum DH specified in the aircraft flight manual (AFM) or equivalent document, if stated.

(b) The minimum descent height (MDH) for an NPA operation 2D approach operation flown without not using the CDFA technique should not be lower than the highest of:

(1) the OCH for the category of aircraft;

(2) the published approach procedure MDH where applicable;

(32) the system minimaum specified in Table 43; or

(4) the lowest MDH permitted for the runway specified in Table 5; or

(53) the minimum lowest MDH specified in the AFM, if stated.

Table 43

System minima — aeroplanes

Facility	**Lowest DH/MDH (ft)**
ILS/MLS/GLS	200
GNSS/SBAS (LPV)	200*
Precision approach radar (PAR)	200
GNSS/SBAS (LP)	250
GNSS (LNAV)	250
GNSS/Baro-VNAV Baro VNAV (LNAV/VNAV)	250
LOC with or without DME	250
SRA (terminating at ½ NM)	250
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350
VOR	300
VOR/DME	250
NDB	350
NDB/DME	300
VDF	350

* For localiser performance with vertical guidance (LPV), a DH of 200 ft may be used only if the published FAS datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250 ft.

DME: distance measuring equipment;

GNSS: global navigation satellite system;

ILS: instrument landing system;

— LNAV: lateral navigation;

— LOC: localiser;

— LPV: localiser performance with vertical guidance

— SBAS: satellite-based augmentation system;

— SRA: surveillance radar approach;

— VDF: VHF direction finder;

— VNAV: vertical navigation;

— VOR: VHF omnidirectional radio range.

Table 5

Runway type minima — aeroplanes

Runway type		**Lowest DH/MDH (ft)**
Instrument runway	Precision approach (PA) runway, category I	200
	NPA runway	250
Non-Instrument runway	Non-instrument runway	Circling minima as shown in Table 15

(c) Where a barometric DA/H or MDA/H is used, this should be adjusted where the ambient temperature is significantly below international standard atmosphere (ISA). GM8 CAT.OP.MPA.110 'Low temperature correction' provides a cold temperature correction table for adjustment of minimum promulgated heights/altitudes.

AMC4 CAT.OP.MPA.110 is replaced by the following:

AMC4 CAT.OP.MPA.110 Aerodrome operating minima

~~CRITERIA FOR ESTABLISHING RVR/CMV~~ DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

~~(a) Aeroplanes~~

~~The following criteria for establishing RVR/CMV should apply:~~

~~(1) In order to qualify for the lowest allowable values of RVR/CMV specified in Table 6.A, the instrument approach should meet at least the following facility specifications and associated conditions:~~

~~(i) Instrument approaches with designated vertical profile up to and including 4.5° for category A and B aeroplanes, or 3.77° for category C and D aeroplanes where the facilities are:~~

~~(A) ILS/microwave landing system (MLS)/GBAS landing system (GLS)/precision approach radar (PAR); or~~

~~(B) APV; and~~

~~where the final approach track is offset by not more than 15° for category A and B aeroplanes or by not more than 5° for category C and D aeroplanes.~~

~~(ii) Instrument approach operations flown using the CDFA technique with a nominal vertical profile, up to and including 4.5° for category A and B aeroplanes, or 3.77° for category C and D aeroplanes, where the facilities are NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA~~

or GNSS/LNAV, with a final approach segment of at least 3 NM, which also fulfil the following criteria:

(A) the final approach track is offset by not more than 15° for category A and B aeroplanes or by not more than 5° for category C and D aeroplanes;

(B) the final approach fix (FAF) or another appropriate fix where descent is initiated is available, or distance to threshold (THR) is available by flight management system/GNSS (FMS/GNSS) or DME; and

(C) if the missed approach point (MAPt) is determined by timing, the distance from FAF or another appropriate fix to THR is ≤ 8 NM.

(iii) Instrument approaches where the facilities are NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA or GNSS/LNAV, not fulfilling the criteria in (a)(1)(ii), or with an MDH ≥ 1 200 ft.

(2) The missed approach operation, after an approach operation has been flown using the CDFA technique, should be executed when reaching the DA/H or the MAPt, whichever occurs first. The lateral part of the missed approach procedure should be flown via the MAPt unless otherwise stated on the approach chart.

(a) The DH or MDH to be used for a 3D or a 2D approach operation should not be lower than thehighest of:

(1) the OCH for the category of aircraft;

(2) the published approach procedure DH or MDH where applicable;(3)

the system minima specified in Table 6;

(4) the minimum DH permitted for the runway/FATO specified in Table 7, if applicable;

or(5) the minimum DH specified in the AFM or equivalent document, if stated.

Table 6

System minima — helicopters

Facility	**Lowest DH/MDH (ft)**
ILS/MLS/GLS	200
GNSS/SBAS (LPV) *	200
Precision approach radar (PAR)	200
GNSS/SBAS (LP)	250
GNSS (LNAV)	250
GNSS/Baro VNAV (LNAV/VNAV)	250
Helicopter PinS approach	250**
LOC with or without DME	250
SRA (terminating at ½ NM)	250

Facility	**Lowest DH/MDH (ft)**
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350

VOR	300
VOR/DME	250
NDB	350
NDB/DME	300
VDF	350

* For LPV, a DH of 200 ft may be used only if the published FAS datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250 ft.

** For PinS approaches with instructions to 'proceed VFR' to an undefined or virtual destination, the DH or MDH should be with reference to the ground below the missed approach point (MAPt).

Table 7

Type of runway/FATO versus lowest DH/MDH — helicopters

Type of runway/FATO	**Lowest DH/MDH (ft)**
Precision approach (PA) runway, category I Non-precision approach (NPA) runway Non-instrument runway	200
Instrument FATO FATO	200 250

Table 7 does not apply to helicopter PinS approaches with instructions to 'proceed VFR'.

AMC5 CAT.OP.MPA 110 is replaced with the following:

AMC5 CAT.OP.MPA.110 Aerodrome operating minima

~~**DETERMINATION OF RVR/CMV/VIS MINIMA FOR NPA, APV, CAT I — AEROPLANES**~~

~~(a) Aeroplanes~~

~~The RVR/CMV/VIS minima for NPA, APV and CAT I operations should be determined as follows:~~

~~(1) The minimum RVR/CMV/VIS should be the highest of the values specified in Table 5 or Table 6.A, but not greater than the maximum values specified in Table 6.A, where applicable.~~

~~(2) The values in Table 5 should be derived from the formula below,~~

~~Required RVR/VIS (m) = [(DH/MDH (ft) x 0.3048)/tanα] — length of approach lights (m)~~

~~where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 5 up to 3.77° and then remaining constant.~~

~~(3) If the approach is flown with a level flight segment at or above MDA/H, 200 m should be added for category A and B aeroplanes and 400 m for category C and D aeroplanes to the minimum RVR/CMV/VIS value resulting from the application of Tables 5 and 6.A.~~

~~(4) An RVR of less than 750 m as indicated in Table 5 may be used:~~

~~(i) for CAT I operations to runways with full approach lighting system (FALS), runway touchdown zone lights (RTZL) and runway centreline lights (RCLL);~~

~~(ii) for CAT I operations to runways without RTZL and RCLL when using an approved head-up guidance landing system (HUDLS), or equivalent approved system, or when conducting a coupled approach or flight-director-flown approach to a DH. The ILS should not be published as a restricted facility; and~~

~~(iii) for APV operations to runways with FALS, RTZL and RCLL when using an approved head-up display (HUD).~~

~~(5) Lower values than those specified in Table 5, for HUDLS and auto-land operations may be used if approved in accordance with Annex V (Part-SPA), Subpart E (SPA.LVO).~~

~~(6) The visual aids should comprise standard runway day markings and approach and runway lights as specified in Table 4. The CAA may approve that RVR values relevant to a basic approach lighting system (BALS) are used on runways where the approach lights are restricted in length below 210 m due to terrain or water, but where at least one cross-bar is available.~~

~~(7) For night operations or for any operation where credit for runway and approach lights is required, the lights should be on and serviceable except as provided for in Table 9.~~

~~(8) For single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:~~

~~(i) an RVR of less than 800 m as indicated in Table 5 may be used for CAT I approaches provided any of the following is used at least down to the applicable DH:~~

~~(A) a suitable autopilot, coupled to an ILS, MLS or GLS that is not published as restricted; or~~

~~(B) an approved HUDLS, including, where appropriate, enhanced vision system (EVS), or equivalent approved system;~~

~~(ii) where RTZL and/or RCLL are not available, the minimum RVR/CMV should not be less than 600 m; and~~

~~(iii) an RVR of less than 800 m as indicated in Table 5 may be used for APV operations to runways with FALS, RTZL and RCLL when using an approved HUDLS, or equivalent approved system, or when conducting a coupled approach to a DH equal to or greater than 250 ft.~~

~~Table 4~~

~~Approach lighting systems~~

~~**Class of lighting facility**~~	~~**Length, configuration and intensity of approach lights**~~
~~FALS~~	~~CAT I lighting system (HIALS ≥720 m) distance coded centreline, Barrette centreline~~
~~IALS~~	~~Simple approach lighting system (HIALS 420 – 719 m) single source, Barrette~~
~~BALS~~	~~Any other approach lighting system (HIALS, MALS or ALS 210 - 419 m)~~
~~NALS~~	~~Any other approach lighting system (HIALS, MALS or ALS <210 m) or no approach lights~~

~~Note: HIALS: high intensity approach lighting system;~~

~~MALS: medium intensity approach lighting system.~~

~~Table 5~~

~~RVR/CMV vs DH/MDH~~

DH or MDH			Class of lighting facility			
			FALS	IALS	BALS	NALS
			See (a)(4),(5),(8) above for RVR <750/800 m			
ft			RVR/CMV (m)			
200	-	210	550	750	1 000	1 200
211	-	220	550	800	1 000	1 200
221	-	230	550	800	1 000	1 200
231	-	240	550	800	1 000	1 200
241	-	250	550	800	1 000	1 300
251	-	260	600	800	1 100	1 300
261	-	280	600	900	1 100	1 300
281	-	300	650	900	1 200	1 400
301	-	320	700	1 000	1 200	1 400
321	-	340	800	1 100	1 300	1 500
341	-	360	900	1 200	1 400	1 600
361	-	380	1 000	1 300	1 500	1 700
381	-	400	1 100	1400	1 600	1 800
401	-	420	1 200	1 500	1 700	1 900
421	-	440	1 300	1 600	1 800	2 000
441	-	460	1 400	1 700	1 900	2 100
461	-	480	1 500	1 800	2 000	2 200
481		500	1 500	1 800	2 100	2 300
501	-	520	1 600	1 900	2 100	2 400
521	-	540	1 700	2 000	2 200	2 400
541	-	560	1 800	2 100	2 300	2 500
561	-	580	1 900	2 200	2 400	2 600
581	-	600	2 000	2 300	2 500	2 700
601	-	620	2 100	2 400	2 600	2 800
621	-	640	2 200	2 500	2 700	2 900
641	-	660	2 300	2 600	2 800	3 000
661	-	680	2 400	2 700	2 900	3 100
681	-	700	2 500	2 800	3 000	3 200
701	-	720	2 600	2 900	3 100	3 300
721	-	740	2 700	3 000	3 200	3 400
741	-	760	2 700	3 000	3 300	3 500
761	-	800	2 900	3 200	3 400	3 600
801	-	850	3 100	3 400	3 600	3 800
851	-	900	3 300	3 600	3 800	4 000
901	-	950	3 600	3 900	4 100	4 300
951	-	1 000	3 800	4 100	4 300	4 500
1 001	-	1100	4 100	4 400	4 600	4 900
1 101	-	1 200	4 600	4 900	5 000	5 000
1 201 and above			5 000	5 000	5 000	5 000

Table 6.A

CAT I, APV, NPA — aeroplanes

Minimum and maximum applicable RVR/CMV (lower and upper cut-off limits)

~~Facility/conditions~~	~~RVR/CMV (m)~~	~~Aeroplane category~~			
		~~A~~	~~B~~	~~C~~	~~D~~
~~ILS, MLS, GLS, PAR, GNSS/SBAS, GNSS/VNAV~~	~~Min~~	~~According to Table 5~~			
	~~Max~~	~~1 500~~	~~1 500~~	~~2 400~~	~~2 400~~
~~NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV with a procedure that fulfils the criteria in AMC4 CAT.OP.MPA.110, (a)(1)(ii)~~	~~Min~~	~~750~~	~~750~~	~~750~~	~~750~~
	~~Max~~	~~1 500~~	~~1 500~~	~~2 400~~	~~2 400~~
~~For NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV:~~ ~~— not fulfilling the criteria in in AMC4 CAT.OP.MPA.110, (a)(1)(ii), or~~ ~~— with a DH or MDH ≥1 200 ft~~	~~Min~~	~~1 000~~	~~1 000~~	~~1 200~~	~~1 200~~
	~~Max~~	~~According to Table 5, if flown using the CDFA technique, otherwise an add-on of 200 m for Category A and B aeroplanes and 400 m for Category C and D aeroplanes applies to the values in Table 5 but not to result in a value exceeding 5 000 m.~~			

DETERMINATION OF RVR OR VIS FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The RVR or VIS for straight-in instrument approach operations should be not less than the greatest of:

(1) the minimum RVR or VIS for the type of runway used according to Table 8;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 9; or

(3) the minimum RVR according to the visual and non-visual aids and on-board equipment used according to Table 10.

If the value determined in (1) is a VIS, then the result is a minimum VIS. In all other cases, the result is a minimum RVR.

(b) For Category A and B aeroplanes, if the RVR or VIS determined in accordance with (a) is greater than 1 500 m, then 1 500 m should be used.

(c) If the approach is flown with a level flight segment at or above the MDA/H, then 200 m should be added to the RVR calculated in accordance with (a) and (b) for Category A and B aeroplanes and 400 m should be added to the RVR calculated in accordance with (a) for Category C and D aeroplanes.

(d) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights, runway end lights and approach lights as defined in Table 11.

Table 8

Type of runway versus minimum RVR or VIS — aeroplanes

Type of runway	Minimum RVR or VIS (m)
PA runway Category I	RVR 550
NPA runway	RVR 750
Non-instrument runway	VIS according to Table 15 (circling minima)

Table 9

RVR versus DH/MDH — aeroplanes

DH or MDH (ft)			Class of lighting facility			
			FALS	IALS	BALS	NALS
			RVR (m)			
200	-	210	550	750	1 000	1 200
211	-	240	550	800	1 000	1 200
241	-	250	550	800	1 000	1 300
251	-	260	600	800	1 100	1 300
261	-	280	600	900	1 100	1 300
281	-	300	650	900	1 200	1 400
301	-	320	700	1 000	1 200	1 400
321	-	340	800	1 100	1 300	1 500
341	-	360	900	1 200	1 400	1 600
361	-	380	1 000	1 300	1 500	1 700
381	-	400	1 100	1 400	1 600	1 800
401	-	420	1 200	1 500	1 700	1 900
421	-	440	1 300	1 600	1 800	2 000
441	-	460	1 400	1 700	1 900	2 100
461	-	480	1 500	1 800	2 000	2 200
481	-	500	1 500	1 800	2 100	2 300
501	-	520	1 600	1 900	2 100	2 400
521	-	540	1 700	2 000	2 200	2 400
541	-	560	1 800	2 100	2 300	2 400
561	-	580	1 900	2 200	2 400	2 400
581	-	600	2 000	2 300	2 400	2 400
601	-	620	2 100	2 400	2 400	2 400
621	-	640	2 200	2 400	2 400	2 400
641	-	660	2 300	2 400	2 400	2 400
661	and above		2 400	2 400	2 400	2 400

Table 10

Visual and non-visual aids and/or on-board equipment versus minimum RVR — aeroplanes

Type of approach	Facilities	Lowest RVR	
		Multi-pilot operations	Single-pilot operations
3D operations	runway touchdown zone lights (RTZL) and runway centre line lights (RCLL)	No limitation	
Final approach track offset ≤15º for category A and B aeroplanes or ≤5º for Category C and D aeroplanes	without RTZL and/or RCLL but using HUDLS or equivalent system; without RTZL and/or RCLL but using autopilot or flight director to the DH	No limitation	600 m
	No RTZL and/or RCLL, not using HUDLS or equivalent system or autopilot or flight director to the DH	750 m	800 m
3D operations	runway touchdown zone lights (RTZL) and runway centre line lights (RCLL) and	800 m	1 000 m

	Final approach track offset >15° for category A and B aeroplanes or >5° for Category C and D aeroplanes		
	without RTZL and RCLL but using HUDLS or equivalent system; autopilot or flight director to the DH and Final approach track offset >15° for category A and B aeroplanes or >5° for Category C and D aeroplanes	800 m	1 000 m
2D operations	Final approach track offset ≤15° for category A and B aeroplanes or ≤5° for Category C and D aeroplanes	750 m	800 m
	Final approach track offset > 15° for Category A and B aeroplanes	1 000 m	1 000 m
	Final approach track offset > 5° for Category C and D aeroplanes	1 200 m	1 200 m

Table 11

Approach lighting systems — aeroplanes

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥720 m) distance coded centre line, barrette centre line
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS <210 m) or no approach lights

(e) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable except as provided for in Table 17.

(f) Where any visual or non-visual aid specified for the approach and assumed to be available in the determination of operating minima is unavailable, revised operating minima will need to be determined.

AMC6 CAT.OP.MPA 110 is replaced with the following:

AMC6 CAT.OP.MPA.110 Aerodrome operating minima

DETERMINATION OF RVR~~/CMV/~~ OR VIS ~~MINIMA~~ FOR ~~NPA, CAT I~~ INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

~~(a) Helicopters~~

~~The RVR/CMV/VIS minima for NPA, APV and CAT I operations should be determined as follows:~~

~~(1) For NPA operations operated in performance class 1 (PC1) or performance class 2 (PC2), the minima specified in Table 6.1.H should apply:~~

~~(i) where the missed approach point is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required;~~

(ii) for night operations, ground lights should be available to illuminate the FATO/runway and any obstacles; and

(iii) for single-pilot operations, the minimum RVR is 800 m or the minima in Table 6.1.H, whichever is higher.

(2) For CAT I operations operated in PC1 or PC2, the minima specified in Table 6.2.H should apply:

(i) for night operations, ground light should be available to illuminate the FATO/runway and any obstacles;

(ii) for single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:

(A) an RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, MLS or GLS, in which case normal minima apply; and

(B) the DH applied should not be less than 1.25 times the minimum use height for the autopilot.

Table 6.1.H: Onshore NPA minima

MDH (ft) *	Facilities vs RVR/CMV (m) **, ***			
	FALS	IALS	BALS	NALS
250–299	600	800	1 000	1 000
300–449	800	1 000	1 000	1 000
450 and above	1 000	1 000	1 000	1 000

*: 'MDH' refers to the initial calculation of MDH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to MDA.

**: The tables are only applicable to conventional approaches with a nominal descent slope of not greater than 4°. Greater descent slopes will usually require that visual glideslope guidance (e.g. precision approach path indicator (PAPI)) is also visible at the MDH.

***: FALS comprise FATO/runway markings, 720 m or more of high-intensity/medium-intensity (HI/MI) approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

IALS comprise FATO/runway markings, 420–719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

BALS comprise FATO/runway markings, <420 m of HI/MI approach lights, any length of low intensity (LI) approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

NALS comprise FATO/runway markings, FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.

Table 6.2.H: Onshore CAT I minima

DH (ft) *	Facilities vs RVR/CMV (m) **, ***			
	FALS	IALS	BALS	NALS
200	500	600	700	1 000
201–250	550	650	750	1 000
251–300	600	700	800	1 000
301 and above	750	800	900	1 000

*: The 'DH' refers to the initial calculation of DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to DA.

**: The table is applicable to conventional approaches with a glideslope up to and including 4°.

***: FALS comprise FATO/runway markings, 720 m or more of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

IALS comprise FATO/runway markings, 420 - 719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

BALS comprise FATO/runway markings, <420 m of HI/MI approach lights, any length of LI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

NALS comprise FATO/runway markings, FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.

The RVR/VIS minima for Type A instrument approach and Type B CAT I instrument approach operations should be determined as follows:

(a) For IFR operations, the RVR or VIS should not be less than the greatest of:

(1) the minimum RVR or VIS for the type of runway/FATO used according to Table 12;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 13; or

(3) for PinS operations with instructions to 'proceed visually', the distance between the MAPt of the PinS and the FATO or its approach light system.

If the value determined in (1) is a VIS, then the result is a minimum VIS. In all other cases, the result is a minimum RVR.

(b) For PinS operations with instructions to 'proceed VFR', the VIS should be compatible with visual flight rules.

(c) For Type A instrument approaches where the MAPt is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of the approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required.

(d) An RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, an MLS, a GLS or LPV, in which case normal minima apply.

(e) For night operations, ground lights should be available to illuminate the FATO/runway and any obstacles.

(f) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights and runway end lights and approach lights as specified in Table 14.

(g) For night operations or for any operation where credit for runway and approach lights as defined in Table 14 is required, the lights should be on and serviceable except as defined in Table 17.

Table 12

Type of runway/FATO versus minimum RVR — helicopters

Type of runway/FATO	Minimum RVR or VIS
PA runway, category I NPA runway Non-instrument runway	RVR 550 m

Instrument FATO	RVR 550 m
FATO	RVR/VIS 800 m

Table 13

Onshore helicopter instrument approach minima

DH/MDH (ft)	**Facilities versus RVR (m)**			
	FALS	**IALS**	**BALS**	**NALS**
200	550	600	700	1 000
201–249	550	650	750	1 000
250–299	600*	700*	800	1 000
300 and above	750*	800	900	1 000

* Minima on 2D approach operations should be no lower than 800 m.

Table 14

Approach lighting systems — helicopters

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centre line, barrette centre line
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS < 210 m) or no approach lights

AMC7 CAT.OP.MPA 110 is replaced with the following:

AMC7 CAT.OP.MPA.110 Aerodrome operating minima

CIRCLING OPERATIONS — AEROPLANES

(a) Circling minima

The following standards should apply for establishing circling minima for operations with aeroplanes:

(1) the MDH for circling operation should not be lower than the highest of:

(i) the published circling OCH for the aeroplane category;

(ii) the minimum circling height derived from Table 15~~7~~; or

(iii) the DH/MDH of the preceding instrument approach procedure (IAP);

(2) the MDA for circling should be calculated by adding the published aerodrome elevation to the MDH, as determined by (a)(1); and

(3) the minimum VIS ~~visibility~~ for circling should be the higher~~st~~ of:

(i) the circling VIS~~visibility~~ for the aeroplane category, if published; or

(ii) the minimum VIS ~~visibility~~ derived from Table 15~~7~~.~~; or~~

~~(iii) the RVR/CMV derived from Tables 5 and 6.A for the preceding instrument approach procedure.~~

Table 157

Circling — aeroplanes

MDH and minimum VIS ~~visibility~~ versus aeroplane category

	Aeroplane category			
	A	B	C	D
MDH (ft)	400	500	600	700
Minimum ~~meteorological visibility~~ VIS (m)	1 500	1 600	2 400	3 600

(b) Conduct of flight — general~~:~~

(1) the MDH and OCH included in the procedure are referenced to aerodrome elevation;

(2) the MDA is referenced to mean sea level;

(3) for these procedures, the applicable visibility is the ~~meteorological visibility~~ VIS; and

(4) operators should provide tabular guidance of the relationship between height above threshold and the in-flight visibility required to obtain and sustain visual contact during the circling manoeuvre.

(c) Instrument approach followed by visual manoeuvring (circling) without prescribed tracks

(1) When the aeroplane is on the initial instrument approach, before visual reference is ~~stabilised~~ established, but not below the MDA/H, the aeroplane should follow the corresponding ~~instrument approach procedure~~ IAP until the appropriate instrument MAPt is reached.

(2) At the beginning of the level flight phase at or above the MDA/H, the instrument approach track ~~determined by radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~ should be maintained until the pilot:

(i) estimates that, in all probability, visual contact with the runway of intended landing or the runway environment will be maintained during the entire circling procedure;

(ii) estimates that the aeroplane is within the circling area before commencing circling; and

(iii) is able to determine the aeroplane's position in relation to the runway of intended landing with the aid of the appropriate ~~external~~ visual references.

(3) If the pilot cannot comply with the conditions in (c)(2) at the MAPt ~~When reaching the published instrument MAPt and the conditions stipulated in (c)(2) are unable to be established by the pilot~~, then a missed approach should be ~~carried out~~executed in accordance with ~~that~~ the ~~instrument approach procedure~~ IAP.

(4) After the aeroplane has left the track of the initial instrument approach, the flight phase outbound from the runway should be limited to an appropriate distance, which is required to align the aeroplane onto the final approach. Such manoeuvres should be conducted to enable the aeroplane to:

(i) ~~to~~ attain a controlled and stable descent path to the intended landing runway; and

(ii) ~~to~~ remain within the circling area and in such way that visual contact with the runway of intended landing or runway environment is maintained at all times.

(5) Flight manoeuvres should be carried out at an altitude/height that is not less than the circling MDA/H.

(6) Descent below the MDA/H should not be initiated until the threshold of the runway to be used has been appropriately identified. The aeroplane should be in a position to continue with a normal rate of descent and land within the touchdown zone (TDZ).

(d) Instrument approach followed by a visual manoeuvring (circling) with prescribed track

(1) The aeroplane should remain on the initial ~~instrument approach procedure~~ IAP until one of the following is reached:

(i) the prescribed divergence point to commence circling on the prescribed track; or

(ii) the MAPt.

(2) The aeroplane should be established on the instrument approach track ~~determined by the radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~ in level flight at or above the MDA/H at or by the circling manoeuvre divergence point.

(…)

(8) Unless otherwise specified in the procedure, final descent should not be commenced from the MDA/H until the threshold of the intended landing runway has been identified and the aeroplane is in a position to continue with a normal rate of descent to land within the ~~touchdown zone~~ TDZ.

(e) Missed approach

(1) Missed approach during the instrument procedure prior to circling~~:~~

(i) ~~if~~ If the missed approach(…)

(ii) ~~if~~ If the ~~instrument approach procedure~~ IAP is carried out with the aid of an ILS, an MLS or ~~an~~ stabilised approach (SAp), the MAPt associated with an ILS~~,~~ or an MLS procedure without glide path (GP-out procedure) or the SAp, where applicable, should be used.

(…)

AMC8 CAT.OP.MPA.110 is replaced with the following:

AMC8 CAT.OP.MPA.110 Aerodrome operating minima

ONSHORE CIRCLING OPERATIONS — HELICOPTERS

For circling, the specified MDH should not be less than 250 ft, and the ~~meteorological visibility~~ VIS not less than 800 m.

AMC10 CAT.OP.MPA.110 is replaced with the following:

AMC10 CAT.OP.MPA.110 Aerodrome operating minima

CONVERSION OF ~~REPORTED METEOROLOGICAL~~ VISIBILITY TO CMV~~RVR~~ — AEROPLANES

~~(a) A conversion from meteorological visibility to RVR/CMV should not be used:~~

~~(1) when reported RVR is not available;~~

~~(2) for calculating take-off minima; and~~

~~(3) for any RVR minima less than 800 m.~~

~~(b) If the RVR is reported as being above the maximum value assessed by the aerodrome operator, e.g. 'RVR more than 1 500 m', it should not be considered as a reported value for (a)(1).~~

~~(c) When converting meteorological visibility to RVR in circumstances other than those in (a), the conversion factors specified in Table 8 should be used.~~

The following conditions apply to the use of converted meteorological visibility (CMV) instead of RVR:

(a) If the reported RVR is not available, a CMV may be substituted for the RVR, except:

(1) to satisfy the take-off minima; or

(2) for the purpose of continuation of an approach in LVOs.

(b) If the minimum RVR for an approach is more than the maximum value assessed by the aerodrome operator, then CMV should be used.

(c) In order to determine CMV from visibility:

(1) for flight planning purposes, a factor of 1.0 should be used;

(2) for purposes other than flight planning, the conversion factors specified in Table 16 should be used.

Table 16~~8~~

Conversion of reported ~~meteorological visibility~~ VIS to RVR/CMV

Light elements in operation	RVR/CMV = reported VIS x ~~meteorological visibility x~~	
	Day	Night
HI approach and runway lights	1.5	2.0
Any type of light installation other than above	1.0	1.5
No lights	1.0	not applicable

AMC11 CAT.OP.MPA.110 is replaced with the following:

AMC11 CAT.OP.MPA.110 Aerodrome operating minima

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT

(a) General

These instructions are intended for use both before ~~pre-flight~~ and during ~~in-~~flight. Only those facilities mentioned in Table 17 should be acceptable to be used to determine the effects of temporarily failed of downgraded equipment. It is, however, not expected that the commander would consult such instructions after passing 1 000 ft above the aerodrome. If failures of ground aids are announced at such a late stage, the approach could be continued at the commander's discretion. If failures are announced before such a late stage in the approach, their effect on the approach should be considered as described in Table 17~~9~~, and the approach may have to be abandoned.

(b) Conditions applicable to Table 17~~9~~:

(1) multiple failures of runway/FATO lights other than those indicated in Table 17~~9~~ should not be acceptable;

(2) ~~deficiencies~~ failures of approach and runway/FATO lights are acceptable at the same time, and the most demanding consequence should be applied ~~treated separately~~; and

(3) failures other than ILS, GLS, MLS affect the RVR only and not the DH.

Table 17~~9~~

Failed or downgraded equipment — effect on landing minima

Operations without ~~a low visibility operations~~ ~~(~~LVO~~)~~ approval

Failed or downgraded equipment	Effect on landing minima	
	~~CAT I~~ Type B	**~~APV, NPA~~ Type A**
Navaid stand-by transmitter	No effect	
Outer ~~M~~marker	FOR CAT I: Not allowed except if ~~replaced by height check at 1 000 ft~~ the required height versus glide path can be checked using other means, e.g. DME fix	APV —not applicable NPA with final approach fix (FAF): no effect unless used as FAF If the FAF cannot be identified (e.g. no method available for timing of descent), NPA ~~approach~~ operations ~~using NPA procedures~~ cannot be conducted
		FOR CAT I: Not allowed except if the required height versus glide path can be checked using other means, e.g. DME fix
Middle marker (ILS only)	No effect	No effect unless used as MAPt
DME	No effect If replaced by RNAV (GNSS) information or the outer marker	
RVR assessment systems	No effect	
Approach lights	Minima as for NALS	
Approach lights except the last 210 m	Minima as for BALS	
Approach lights except the last 420 m	Minima as for IALS	
Standby power for approach lights	No effect	
Edge lights, threshold lights and runway end lights	Day: no effect; Night: not allowed	
~~Centreline~~ Centre line lights	Aeroplanes: No effect if flight director (F/D), HUDLS or autoland; otherwise RVR 750 m Helicopters: No effect on CAT I and HELI SA CAT I approach operations	No effect but the minimum RVR should be 750 m

Failed or downgraded equipment	Effect on landing minima	
	~~CAT I~~ Type B	~~APV, NPA~~ Type A
~~Centreline~~ Centre line lights spacing increased to 30 m	No effect	
~~Touchdown zone~~ TDZ lights	Aeroplanes: No effect if F/D, HUDLS or autoland; otherwise RVR 750 m Helicopters: No effect	No effect
Taxiway lighting system	No effect	

GM2 CAT.OP.MPA.110 is replaced by the following:

GM2 CAT.OP.MPA.110 Aerodrome operating minima

APPROACH LIGHTING SYSTEMS — ICAO, FAA

The following table provides a comparison of ICAO and FAA specifications.

Table 19 ~~1~~

Approach lighting systems — ICAO and FAA specifications

Class of lighting facility	Length, configuration and intensity of approach lights
FALS	ICAO: CAT I lighting system ~~(HIALS ≥ 900 m)~~ (HIALS ≥ 720 m) distance coded ~~centreline~~ centre line, barrette ~~centreline~~ centre line FAA: ALSF1, ALSF2, SSALR, MALSR, high or medium intensity and/or flashing lights, 720 m or more
IALS	ICAO: simple approach lighting system (HIALS 420–719 m) single source, barrette FAA: MALSF, MALS, SALS/SALSF, SSALF, SSALS, high or medium intensity and/or flashing lights, 420–719 m
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m) FAA: ODALS, high or medium intensity or flashing lights 210–419 m
NALS	Any other approach lighting system (HIALS, MALS or ALS <210 m) or no approach lights

~~Note: ALSF: approach lighting system with sequenced flashing lights;~~

~~MALS: medium-intensity approach lighting system;~~

~~MALSF: medium-intensity approach lighting system with sequenced flashing lights;~~

~~MALSR: medium-intensity approach lighting system with runway alignment indicator lights;~~

~~ODALS: omnidirectional approach lighting system;~~

~~SALS: simple approach lighting system;~~

~~SALSF: short approach lighting system with sequenced flashing lights;~~

~~SSALF: simplified short approach lighting system with sequenced flashing lights;~~

~~SSALR: simplified short approach lighting system with runway alignment indicator lights;~~

~~SSALS: simplified short approach lighting system.~~

Point (a) of GM3 CAT.OP.MPA.110 is replaced by the following:

GM3 CAT.OP.MPA.110 Aerodrome operating minima

SBAS OPERATIONS

(a) SBAS LPV~~CAT I~~ operations with a DH of 200 ft depend on an SBAS system approved for operations down to a DH of 200 ft.

(…)

The following GM4 CAT.OP.MPA.110 is inserted:

GM4 CAT.OP.MPA.110 Aerodrome operating minima

MEANS TO DETERMINE THE REQUIRED RVR BASED ON DH AND LIGHTING FACILITIES

The values in Table 9 are derived from the formula below:

Minimum RVR (m) = [(DH/MDH (ft) x 0.3048)/tanα] — length of approach lights (m)

where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 9 up to 3.77° and then remaining constant. An upper RVR limit of 2 400 m has been applied to the table.

The following GM5 CAT.OP.MPA.110 is inserted:

GM5 CAT.OP.MPA.110 Aerodrome operating minima

USE OF DH FOR NPAs FLOWN USING THE CDFA TECHNIQUE

AMC3 CAT.OP.MPA.110 provides that, in certain circumstances, a published MDH may be used as a DH for a 2D operation flown using the CDFA technique.

The safety of the use of MDH as DH in CDFA operations has been verified by at least two independent analyses concluding that the CDFA using MDH as DH without any add-on is safer than the traditional step-down and level-flight NPA operation. A comparison has been made between the safety level of using MDH as DH without an add-on with the well-established safety level resulting from the ILS collision risk model. The NPA used was the most demanding, i.e. most tightly designed NPA, which offers the least additional margins. It should be noted that the design limits of the ILS approach design, e.g. the maximum GP angle of 3,5 degrees, must be observed for the CDFA in order to keep the validity of the comparison.

There is a wealth of operational experience in the UK and Europe confirming the above-mentioned analytical assessments. It cannot be expected that each operator is able to conduct similar safety assessments, and this is not necessary. The safety assessments already performed take into account the most demanding circumstances at hand, like the most tightly designed NPA procedures and other 'worst-case scenarios'. The assessments naturally focus on cases where the controlling obstacle is located in the missed approach area.

However, it is necessary for operators to assess whether their cockpit procedures and training are adequate to ensure minimal height loss in case of a go-around manoeuvre. Suitable topics for the safety assessment required by each operator may include:

— understanding of the CDFA concept including the use of the MDA/H as DA/H;

— cockpit procedures that ensure flight on speed, on path and with proper configuration and energy management;

— cockpit procedures that ensure gradual decision-making; and

— identification of cases where an increase of the DA/H may be necessary because of non-standard circumstances, etc.

GM1 CAT.OP.MPA.110(a) is replaced by the following:

GM~~1~~6 CAT.OP.MPA.110~~(a)~~ Aerodrome operating minima

INCREMENTS SPECIFIED BY THE CAA

Additional increments to the published minima may be specified by the CAA to take into account certain operations, such as downwind approaches, ~~and~~ single-pilot operations or approaches flown not using the CDFA technique.

The following GM7 CAT.OP.MPA.110 is inserted:

GM7 CAT.OP.MPA.110 Aerodrome operating minima

USE OF COMMERCIALLY AVAILABLE INFORMATION

When an operator uses commercially available information to establish aerodrome operating minima, the operator remains responsible for ensuring that the material used is accurate and suitable for its operation, and that aerodrome operating minima are calculated in accordance with the method specified in Part C of its operations manual and approved by the CAA.

The procedures in ORO.GEN.205 ‘Contracted activities’ apply in this case.

The following GM8 CAT.OP.MPA.110 is inserted:

GM8 CAT.OP.MPA.110 Aerodrome operating minima

LOW TEMPERATURE CORRECTION

(a) An operator may determine the aerodrome temperature below which a correction should be applied to the DA/H.

(b) Table 20 may be used to determine the correction that should be applied.

(c) The calculations in the table are for a sea-level aerodrome; they are therefore conservative when applied at higher-level aerodromes.

(d) Guidance on accurate corrections for specific conditions (if required) is available in PANS-OPS, Volume III (ICAO Doc 8168) Section 2 Chapter 4.First Edition, 2018.

Table 20

Temperature corrections to be applied to barometric DH/MDH

Aerodrome temperature (°C)	*Height above the elevation of the altimeter setting source (ft)*													
	200	300	400	500	600	700	800	900	1 000	1 500	2 000	3 000	4 000	5 000
0	20	20	30	30	40	40	50	50	60	90	120	170	230	280
-10	20	30	40	50	60	70	80	90	100	150	200	290	390	490

-20	30	50	60	70	90	100	120	130	140	210	280	420	570	710
-30	40	60	80	100	120	140	150	170	190	280	380	570	760	950
-40	50	80	100	120	150	170	190	220	240	360	480	720	970	1 210
-50	60	90	120	150	180	210	240	270	300	450	590	890	1 190	1 500

The following GM9 CAT.OP.MPA.110 is inserted:

GM9 CAT.OP.MPA.110 Aerodrome operating minima

AERODROME OPERATING MINIMA — HELICOPTERS

High vertical speeds should be avoided due to unstable aerodynamics and potential transient autorotation state of the main rotor.

Vertical speeds at or below 800 ft/min should be considered to be normal, and vertical speeds above 1 000 ft/min should be considered to be high.

The vertical speed on final approach increases with the descent angle and the ground speed (GS), including tailwinds. Whereas the helicopter should be manoeuvred into the wind during the visual segment of an instrument approach, tailwinds may be encountered during the instrument segments of the approach.

If the vertical speed is above 1 000 ft/min, a go-around should be considered. Greater vertical speeds may be used based on the available data in the rotorcraft flight manual.

Table 21 below gives an indication of the vertical speed based on the descent angles and ground speed.

Table 21

Examples of vertical speeds

Ground speed	**Descent angle**	**Vertical speed**
80 kt	5.7° (10 %)	800 ft/min
100 kt	5.7° (10 %)	1 000 ft/min
80 kt	7.5° (13.2 %)	1 050 ft/min
100 kt	7.5° (13.2 %)	1 300 ft/min

Note: A GS of 80 kt may be the result of an indicated airspeed (IAS) of 60 kt and a tailwind component of 20 kt.

The following GM1 CAT.OP.MPA.110(b)(6) is inserted:

GM1 CAT.OP.MPA.110(b)(6) Aerodrome operating minima

VISUAL AND NON-VISUAL AIDS AND INFRASTRUCTURE

'Visual and non-visual aids and infrastructure' refers to all equipment and facilities required for the procedure to be used for the intended instrument approach operation. This includes but is not limited to lights, markings, ground- or space-based radio aids, etc.

AMC1 CAT.OP.MPA.115 is replaced by the following:

AMC1 CAT.OP.MPA.115 Approach flight technique — aeroplanes

CONTINUOUS DESCENT FINAL APPROACH (CDFA)

(a) Flight techniques:

(1) The CDFA technique should ensure that an approach can be flown on the desired vertical path and track in a stabilised manner, without significant vertical path changes during the final segment descent to the runway. This technique applies to an approach with no vertical guidance and controls the descent path until the DA/DH. This descent path can be either:

(i) a recommended descent rate, based on estimated ground

speed;(ii) a descent path depicted on the approach chart; or

(iii) a descent path coded in the flight management system in accordance with the approach chart descent path.

(2) The operator should either provide charts which depict the appropriate cross check altitudes/heights with the corresponding appropriate range information, or such information should be calculated and provided to the flight crew in an appropriate and usable format. Generally, the MAPt is published on the chart.

(3) The approach should be flown as an SAp.

(4) The required descent path should be flown to the DA/H, observing any step-down crossing altitudes if applicable.

(5) This DA/H should take into account any add-on to the published minima as identified by the operator's management system and should be specified in the OM (aerodrome operating minima).

(6) During the descent, the pilot monitoring should announce crossing altitudes as published fixes and other designated points are crossed, giving the appropriate altitude or height for the appropriate range as depicted on the chart. The pilot flying should promptly adjust the rate of descent as appropriate.

(7) The operator should establish a procedure to ensure that an appropriate callout is made when the aeroplane is approaching DA/H. If the required visual references are not established at DA/H, the missed approach procedure is to be executed promptly.

(8) The descent path should ensure that little or no adjustment of attitude or thrust/power is needed after the DA/H to continue the landing in the visual segment.

(9) The missed approach should be initiated no later than reaching the MAPt or at the DA/H, whichever comes first. The lateral part of the missed approach should be flown via the MAPt unless otherwise stated on the approach chart.

(b) Flight techniques conditions:

(1) The approach should be considered to be fully stabilised when the aeroplane is:(i) tracking on the required approach path and profile;

(ii) in the required configuration and attitude;

(iii) flying with the required rate of descent and speed;

and(iv) flying with the appropriate thrust/power and trim.

(2) The aeroplane is considered established on the required approach path at the appropriate energy for stable flight using the CDFA technique when:

(i) it is tracking on the required approach path with the correct track set, approach aids tuned and identified as appropriate to the approach type flown and on the required vertical profile; and

(ii) it is at the appropriate attitude and speed for the required target rate of descent (ROD) with the appropriate thrust/power and trim.

(3) Stabilisation during any straight-in approach without visual reference to the ground should be achieved at the latest when passing 1 000 ft above runway threshold elevation. For approaches with a designated vertical profile applying the CDFA technique, a later stabilisation in speed may be acceptable if higher than normal approach speeds are required by ATC procedures or allowed by the OM. Stabilisation should, however, be achieved not later than 500 ft above runway threshold elevation.

(4) For approaches where the pilot has visual reference with the ground, stabilisation should be achieved not later than 500 ft above aerodrome elevation. However, the aeroplane should be stabilised when passing 1 000 ft above runway threshold elevation; in the case of circling approaches flown after a CDFA, the aircraft should be stabilised in the circling configuration not later than passing 1 000 ft above the runway elevation.

(5) To ensure that the approach can be flown in a stabilised manner, the bank angle, rate ofdescent and thrust/power management should meet the following performances:

(i) The bank angle should be less than 30 degrees.

(ii) The target rate of descent (ROD) should not exceed 1 000 fpm and the ROD deviations should not exceed ± 300 fpm, except under exceptional circumstances which have been anticipated and briefed prior to commencing the approach; for example, a strong tailwind. Zero ROD may be used when the descent path needs to be regained from below the profile. The target ROD may need to be initiated prior to reaching the required descent point, typically 0.3 NM before the descent point, dependent upon ground speed, which may vary for each type/class of aeroplane.

(iii) The limits of thrust/power and the appropriate range should be specified in the OM Part B or equivalent document.

(iv) The optimum angle for the approach slope is 3° and should not exceed 4.5°.

(v) The CDFA technique should be applied only to approach procedures based on NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV and fulfil the following criteria:

(A) the final approach track off-set ≤ 5° except for Category A and B aeroplanes,where the approach-track off-set is ≤ 15°; and

(B) a FAF, or another appropriate fix, e.g. final approach point, where descentinitiated is available; and

(C) the distance from the FAF or another appropriate fix to the threshold (THR)is less than or equal to 8 NM in the case of timing; or

(D) the distance to the THR is available by FMS/GNSS or DME; or

(E) the minimum final-segment of the designated constant angle approach pathshould not be less than 3 NM from the THR unless approved by the authority.

(7) The CDFA techniques support a common method for the implementation of flight-director-guided or auto-coupled RNAV approaches.

The following criteria apply to CDFA:

(a) For each NPA procedure to be used, the operator should provide information allowing the flight crew to determine the appropriate descent path. The information required is a descent path depicted on the approach chart including check altitude/heights against range and if available:

(1) a descent path coded into the aircraft flight management system; or

(2) a recommended descent rate based on estimated ground speed.

(b) The information provided to the crew should observe human factors principles.

(c) The descent path should be calculated to pass at or above the minimum altitude specified at any step-down fix.

(d) The optimum angle for the descent path is 3° and should not exceed 4,5° except for steep approach operations approved in accordance with this Part.

(e) For multi-pilot operations, the operator should establish procedures that require:

(1) the pilot monitoring to verbalise deviations from the required descent path;

(2) the pilot flying to make prompt corrections to deviation from the required descent path; and

(3) a call-out to be made when the aircraft is approaching the DA/H.

(f) A missed approach should be executed promptly at the DA/H or the MAPt, whichever is first, if the required visual references have not been established.

(g) For approaches other than circling approaches, the lateral part of the missed approach should be flown via the MAPt unless otherwise stated on the approach chart.

AMC2 CAT.OP.MPA.115 is replaced by the following:

AMC2 CAT.OP.MPA.115 Approach flight technique — aeroplanes

~~**NPA OPERATIONS WITHOUT APPLYING THE CDFA TECHNIQUE**~~

APPROACH OPERATIONS USING NPA PROCEDURES FLOWN WITH A FLIGHT TECHNIQUE OTHER THAN THECDFA

(…)

(d) In case the CDFA technique is not used and when the MDA/H is high, it may be appropriate to make an early descent to the MDA/H with appropriate safeguards such as the application of a significantly higher RVR~~/~~ or VIS.

(e) The procedures that are flown with level flight at~~/~~ or above the MDA/H should be listed in the OM.

(f) Operators should categorise aerodromes where there are approaches that require level flight at~~/~~ or above the MDA/H as B ~~and~~ or C. Such aerodrome categorisation will depend upon the operator's experience, operational exposure, training programme(s) and flight crew qualification(s).

AMC 3 CAT.OP.MPA.115 is replaced by the following:

AMC3 CAT.OP.MPA.115 Approach flight technique — aeroplanes

OPERATIONAL PROCEDURES AND INSTRUCTIONS AND TRAINING

(a) The operator should establish procedures and instructions for flying approaches using the CDFA technique and not using it. These procedures should be included in the operations manual ~~OM~~ and should include the duties of the flight crew during the conduct of such operations. The operator should ensure that the initial and recurrent flight crew training required by ORO.FC includes the use of the CDFA technique.

(b) Operators holding an approval to use another technique for NPAs on certain runways should establish procedures for the application of such techniques.

~~(b) The operator should at least specify in the OM the maximum ROD for each aeroplane type/class operated and the required visual reference to continue the approach below:~~

~~(1) the DA/H, when applying the CDFA technique; and~~

~~(2) the MDA/H, when not applying the CDFA technique.~~

~~(c) The operator should establish procedures which prohibit level flight at MDA/H without the flight crew having obtained the required visual references. It is not the intention to prohibit level flight at MDA/H when conducting a circling approach, which does not come within the definition of the CDFA technique.~~

~~(d) The operator should provide the flight crew with unambiguous details of the technique used (CDFA or not). The corresponding relevant minima should include:~~

~~(1) type of decision, whether DA/H or~~

~~MDA/H;(2) MAPt as applicable; and~~

~~(3) appropriate RVR/VIS for the approach operation and aeroplane category.~~

~~(e) Training~~

~~(1) Prior to using the CDFA technique, each flight crew member should undertake appropriate training and checking as required by Subpart FC of Annex III (ORO.FC). The operator's proficiency check should include at least one approach to a landing or missed approach as appropriate using the CDFA technique or not. The approach should be operated to the lowest appropriate DA/H or MDA/H, as appropriate; and, if conducted ina FSTD, the approach should be operated to the lowest approved RVR. The approach is not in addition to any manoeuvre currently required by either Part-FCL or Part-CAT. The provision may be fulfilled by undertaking any currently required approach, engine out orotherwise, other than a precision approach (PA), whilst using the CDFA technique.~~

~~(2) The policy for the establishment of constant predetermined vertical path and approach stability is to be enforced both during initial and recurrent pilot training and checking. The relevant training procedures and instructions should be documented in the operations manual.~~

~~(3) The training should emphasise the need to establish and facilitate joint crew procedures and crew resource management (CRM) to enable accurate descent path control and the provision to establish the aeroplane in a stable condition as required by the operator's operational procedures.~~

~~(4) During training, emphasis should be placed on the flight crew's need to:~~

~~(i) maintain situational awareness at all times, in particular with reference to therequired vertical and horizontal profile;~~

~~(ii) ensure good communication channels throughout the approach;~~

(iii) ensure accurate descent-path control particularly during any manually-flown descent phase. The monitoring pilot should facilitate good flight path control by:

(A) communicating any altitude/height crosschecks prior to the actual passingof the range/altitude or height crosscheck;

(B) prompting, as appropriate, changes to the target ROD;

and(C) monitoring flight path control below DA/MDA;

(iv) understand the actions to be taken if the MAPt is reached prior to the MDA/H;

(v) ensure that the decision for a missed approach is taken no later than whenreaching the DA/H or MDA/H;

(vi) ensure that prompt action for a missed approach is taken immediately when reaching DA/H if the required visual reference has not been obtained as there may be no obstacle protection if the missed approach procedure manoeuvre is delayed;

(vii) understand the significance of using the CDFA technique to a DA/H with an associated MAPt and the implications of early missed approach manoeuvres; and

(viii) understand the possible loss of the required visual reference due to pitch-change/climb when not using the CDFA technique for aeroplane types or classes that require a late change of configuration and/or speed to ensure the aeroplane is in the appropriate landing configuration.

(5) Additional specific training when not using the CDFA technique with level flight at or above MDA/H

(i) The training should detail:

(A) the need to facilitate CRM with appropriate flight crew communication in particular;

(B) the additional known safety risks associated with the 'dive-and-drive' approach philosophy which may be associated with non-CDFA;

(C) the use of DA/H during approaches flown using the CDFA technique;

(D) the significance of the MDA/H and the MAPt where appropriate;

(E) the actions to be taken at the MAPt and the need to ensure that the aeroplane remains in a stable condition and on the nominal and appropriate vertical profile until the landing;

(F) the reasons for increased RVR/Visibility minima when compared to the application of CDFA;

(G) the possible increased obstacle infringement risk when undertaking level flight at MDA/H without the required visual references;

(H) the need to accomplish a prompt missed approach manoeuvre if the required visual reference is lost;

(I) the increased risk of an unstable final approach and an associated unsafe landing if a rushed approach is attempted either from:

(a) inappropriate and close-in acquisition of the required visual reference; or

(b) unstable aeroplane energy and or flight path control;

and(J) the increased risk of controlled flight into terrain (CFIT).

The following AMC1 CAT.OP.MPA.115(a) is inserted:

AMC1 CAT.OP.MPA.115(a) Approach flight technique — aeroplanes

STABILISED APPROACH OPERATIONS — AEROPLANES

The following criteria should be satisfied for all stabilised approach operations with aeroplanes:

(a) The flight management systems and approach aids should be correctly set, and any required radio aids identified before reaching a predetermined point or altitude/height on the approach.

(b) The aeroplane should be flown according to the following criteria from a predetermined point or altitude/height on the approach:

(1) the angle of bank should be less than 30 degrees; and

(2) the target rate of descent should be that required to maintain the correct vertical path at the planned approach speed.

(c) Variations in the rate of descent should normally not exceed 50 % of the target rate of descent and not more than the maximum rate of decent declared in the operator's manuals.

(d) An aeroplane should be considered stabilised for landing when the following conditions are met:

(1) the aeroplane is tracking within an acceptable tolerance of the required lateral path;

(2) the aeroplane is tracking within an acceptable tolerance of the required vertical path;

(3) the vertical speed of the aeroplane is within an acceptable tolerance of the required rate of descent;

(4) the airspeed of the aeroplane is within an acceptable tolerance of the intended landing speed;

(5) the aeroplane is in the correct configuration for landing, unless operating procedures require a final configuration change for performance reasons after visual reference is acquired; and

(6) the thrust/power and trim settings are appropriate, and

(7) landing checklist completed.

(e) The aeroplane should be stabilised for landing before reaching 500 ft above the landing runway threshold elevation.

(f) For approach operations where the pilot does not have visual reference with the ground, the aeroplane should additionally be stabilised for landing before reaching 1 000 ft above the landing runway threshold elevation except that a later stabilisation in airspeed and/or thrust power may be acceptable, if higher than normal approach speeds are required for operational reasons specified in the operations manual.

(g) The operator should specify the following in the operations manual:

(1) the acceptable tolerances referred to in (d);

(2) the means to identify the predetermined points referred to in (a) and (b). This should normally be the FAF.

(h) When the operator requests approval for an alternative to the stabilised approach criteria for a particular approach to a particular runway, the operator should demonstrate that the proposed alternative will ensure that an acceptable level of safety is achieved.

The following GM1 CAT.OP.MPA.115(a) is inserted:

GM1 CAT.OP.MPA.115(a) Approach flight techniques — aeroplanes

ACCEPTABLE TOLERANCES FOR STABILISED APPROACH OPERATIONS

(a) The requirement for the aircraft to be tracking within an acceptable tolerance of the required lateral path does not imply that the aircraft has to be aligned with the runway centre line by any particular height.

(b) The target rate of descent for the final approach segment (FAS) of a stabilised approach normally does not exceed 1 000 fpm. Where a rate of descent of more than 1 000 fpm will be required (e.g. due to high ground speed or a steeper-than-normal approach path), this should be briefed in advance.

(c) Operational reasons for specifying a higher-than-normal approach speed below 1 000 ft may include compliance with air traffic control (ATC) speed restrictions.

(d) For operations where a level flight segment is required during the approach (e.g. circling approaches or approaches flown as non-CDFA), the criteria in point (b) of AMC1 CAT.OP.MPA.115(a) should apply from the predetermined point until the start of the level flight segment and again from the point at which the aircraft begins descent from the level flight segment down to a point of 50 ft above the threshold or the point where the flare manoeuvre is initiated, if higher.

GM1 CAT.OP.MPA.115 is replaced by the following:

GM1 CAT.OP.MPA.115(b) Approach flight technique — aeroplanes

CONTINUOUS DESCENT FINAL APPROACH (CDFA)

(a) Introduction

(1) Controlled flight into terrain (CFIT) is a major hazard in aviation. Most CFIT accidents occur in the ~~final approach segment~~ FAS of ~~non-precision approaches;~~ approach operations flown using NPA procedures. T~~t~~he use of stabilised-approach criteria on a continuous descent with a constant, predetermined vertical path is seen as a major improvement in safety during the conduct of such approaches. ~~Operators should ensure that the following techniques are adopted as widely as possible, for all approaches.~~

(2) The elimination of level flight segments at MDA close to the ground during approaches, and the avoidance of major changes in attitude and power/thrust close to the runway that can destabilise approaches, are seen as ways to reduce operational risks significantly.

(3) The term CDFA has been selected to cover a flight technique for ~~any type of~~ instrument approach operations using NPA procedures ~~operation~~.

(4) The advantages of CDFA are as follows:

(i) the technique enhances safe approach operations by the utilisation of standard operating practices;

(ii) the technique is similar to that used when flying an ILS approach, including when executing the missed approach and the associated missed approach procedure manoeuvre;

(iii) the aeroplane attitude may enable better acquisition of visual cues;

(iv) the technique may reduce pilot workload;

(v) the approach profile is fuel-efficient;

(vi) the approach profile affords reduced noise levels;

(vii) the technique affords procedural integration with ~~APV~~ 3D approach operations; and

(viii) when used and the approach is flown in a stabilised manner, CDFA is the safest approach technique for all ~~NPA operations~~ instrument approach operations using NPA procedures.

(b) ~~CDFA~~

~~(1) Continuous descent final approach is defined in Annex I to this Regulation.~~

~~(2) An approach is only suitable for application of a CDFA technique when it is flown along a nominal vertical profile: a nominal vertical profile is not forming part of the approach procedure design, but can be flown as a continuous descent. The nominal vertical profile information may be published or displayed on the approach chart to the pilot by depicting the nominal slope or range/distance vs height. Approaches with a nominal vertical profile are considered to be:~~

~~(i) NDB, NDB/DME;~~

~~(ii) VOR, VOR/DME;~~

~~(iii) LOC, LOC/DME;~~

~~(iv) VDF, SRA; or~~

~~(v) GNSS/LNAV.~~

~~(3)~~ Stabilised approach (SAp) ~~is defined in Annex I to this Regulation~~.

(~~i~~1) The control of the descent path is not the only consideration when using the CDFA technique. Control of the aeroplane's configuration and energy is also vital to the safe conduct of an approach.

(~~ii~~2) The control of the flight path, described above as one of the specifications for conducting an SAp, should not be confused with the path specifications for using the CDFA technique. The predetermined path specification for conducting an SAp are established by the operator and published in the operations manual ~~part B.~~

(~~iii~~3) The appropriate descent path ~~predetermined approach slope specifications~~ for applying the CDFA technique is ~~are~~ established by the following:

(A) the published 'nominal' slope information when the approach has a nominal vertical profile; and

(B) the designated final-approach segment minimum of 3 NM, and maximum, when using timing techniques, of 8 NM.

(~~iv~~4) ~~An SAp~~ Straight-in approach operations using CDFA ~~will never~~ do not have a~~ny~~ level segment of flight at ~~DA/H or~~ MDA/H ~~as applicable~~. This enhances safety by mandating a prompt missed approach procedure manoeuvre at DA/H ~~or the MDA/H~~.

(v5) An approach using the CDFA technique is will always be flown as an SAp, since this is a specification for applying CDFA. However, an SAp does not have to be flown using the CDFA technique, for example, a visual approach.

(c) Circling approach operations using the CDFA technique

Circling approach operations using the CDFA technique require a continuous descent from an altitude/height at or above the FAF altitude/height until MDA/H or visual flight manoeuvre altitude/height. This does not preclude level flight at or above the MDA/H. This level flight may be at MDA/H while following the IAP or after visual reference has been established as the aircraft is aligned with the final approach track. The conditions for descent from level flight are described in AMC7 CAT.OP.MPA.110.

AMC2 CAT.OP.MPA.126 is replaced by the following:

AMC2 CAT.OP.MPA.126 Performance-based navigation

MONITORING AND VERIFICATION

[...]

(a) Altimetry settings for RNP APCH operations using Baro

VNAV[...]

(2) Temperature compensation

(i) For RNP APCH operations to LNAV/VNAV minima using Baro VNAV:

(A) [...]

(B) when the temperature is within promulgated limits, the flight crew shouldnot make compensation to the altitude at the FAF and DA/H;

[...]

AMC1 CAT.OP.MPA.150(b) is deleted

~~AMC1 CAT.OP.MPA.150(b) Fuel Policy~~

~~**PLANNING CRITERIA — AEROPLANES**~~

~~The operator should base the defined fuel policy, including calculation of the amount of fuel to be on board for departure, on the following planning criteria:~~

~~(a) Basic procedure~~

~~The usable fuel to be on board for departure should be the sum of the following:~~

~~(1) Taxi fuel, which should not be less than the amount expected to be used prior to take-off. Local conditions at the departure aerodrome and auxiliary power unit (APU) consumption should be taken into account.~~

~~(2) Trip fuel, which should include:~~

~~(i) fuel for take-off and climb from aerodrome elevation to initial cruising level/altitude, taking into account the expected departure routing;~~

~~(ii) fuel from top of climb to top of descent, including any step climb/descent;~~

~~(iii) fuel from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and~~

~~(iv) fuel for approach and landing at the destination aerodrome.~~

~~(3) Contingency fuel, except as provided for in (b), which should be the higher of:~~

~~(i) Either:~~

~~(A) 5 % of the planned trip fuel or, in the event of in-flight replanning, 5 % of the trip fuel for the remainder of the flight;~~

~~(B) not less than 3 % of the planned trip fuel or, in the event of in-flight replanning, 3 % of the trip fuel for the remainder of the flight, provided that an en-route alternate (ERA) aerodrome is available;~~

~~(C) an amount of fuel sufficient for 20 minutes flying time based upon the planned trip fuel consumption, provided that the operator has established a fuel consumption monitoring programme for individual aeroplanes and uses valid data determined by means of such a programme for fuel calculation; or~~

~~(D) an amount of fuel based on a statistical method that ensures an appropriate statistical coverage of the deviation from the planned to the actual trip fuel. This method is used to monitor the fuel consumption on each city pair/aeroplane combination and the operator uses this data for a statistical analysis to calculate contingency fuel for that city pair/aeroplane combination;~~

~~(ii) or an amount to fly for 5 minutes at holding speed at 1 500 ft (450 m), above the destination aerodrome in standard conditions.~~

~~(4) Alternate fuel, which should:~~

~~(i) include:~~

~~(A) fuel for a missed approach from the applicable DA/H or MDA/H at the destination aerodrome to missed approach altitude, taking into account the complete missed approach procedure;~~

~~(B) fuel for climb from missed approach altitude to cruising level/altitude, taking into account the expected departure routing;~~

~~(C) fuel for cruise from top of climb to top of descent, taking into account the expected routing;~~

~~(D) fuel for descent from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and~~

~~(E) fuel for executing an approach and landing at the destination alternate aerodrome;~~

~~(ii) where two destination alternate aerodromes are required, be sufficient to proceed to the alternate aerodrome that requires the greater amount of alternate fuel.~~

~~(5) Final reserve fuel, which should be:~~

~~(i) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes; or~~

~~(ii) for aeroplanes with turbine engines, fuel to fly for 30 minutes at holding speed at 1 500 ft (450 m) above aerodrome elevation in standard conditions, calculated with the estimated mass on arrival at the destination alternate aerodrome or the destination aerodrome, when no destination alternate aerodrome is required.~~

~~(6) The minimum additional fuel, which should permit:~~

(i) ~~the aeroplane to descend as necessary and proceed to an adequate alternate aerodrome in the event of engine failure or loss of pressurisation, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route, and~~

(A) ~~hold there for 15 minutes at 1 500 ft (450 m) above aerodrome elevation in standard conditions; and~~

(B) ~~make an approach and landing,~~

~~except that additional fuel is only required if the minimum amount of fuel calculated in accordance with (a)(2) to (a)(5) is not sufficient for such an event; and~~

(ii) ~~holding for 15 minutes at 1 500 ft (450 m) above destination aerodrome elevation in standard conditions, when a flight is operated without a destination alternate aerodrome.~~

(7) ~~Extra fuel, which should be at the discretion of the commander.~~

(b) ~~Reduced contingency fuel (RCF) procedure~~

~~If the operator's fuel policy includes pre-flight planning to a destination 1 aerodrome (commercial destination) with an RCF procedure using a decision point along the route and a destination 2 aerodrome (optional refuel destination), the amount of usable fuel, on board for departure, should be the greater of (b)(1) or (b)(2):~~

(1) ~~The sum of:~~

(i) ~~taxi fuel;~~

(ii) ~~trip fuel to the destination 1 aerodrome, via the decision point;~~

(iii) ~~contingency fuel equal to not less than 5 % of the estimated fuel consumption from the decision point to the destination 1 aerodrome;~~

(iv) ~~alternate fuel or no alternate fuel if the decision point is at less than 6 hours from the destination 1 aerodrome and the requirements of **CAT.OP.MPA.180(b)(2),** are fulfilled;~~

(v) ~~final reserve fuel;~~

(vi) ~~additional fuel; and~~

(vii) ~~extra fuel if required by the commander.~~

(2) ~~The sum of:~~

(i) ~~taxi fuel;~~

(ii) ~~trip fuel to the destination 2 aerodrome, via the decision point;~~

(iii) ~~contingency fuel equal to not less than the amount calculated in accordance with (a)(3) above from departure aerodrome to the destination 2 aerodrome;~~

(iv) ~~alternate fuel, if a destination 2 alternate aerodrome is required;~~

(v) ~~final reserve fuel;~~

(vi) ~~additional fuel; and~~

(vii) ~~extra fuel if required by the commander.~~

(c) ~~Predetermined point (PDP) procedure~~

~~If the operator's fuel policy includes planning to a destination alternate aerodrome where the distance between the destination aerodrome and the destination alternate aerodrome is such that a flight can only be routed via a predetermined point to one of these aerodromes, the amount of usable fuel, on board for departure, should be the greater of (c)(1) or (c)(2):~~

(1) ~~The sum of:~~

~~(i) taxi fuel;~~

~~(ii) trip fuel from the departure aerodrome to the destination aerodrome, via the predetermined point;~~

~~(iii) contingency fuel calculated in accordance with (a)(3);~~

~~(iv) additional fuel if required, but not less than:~~

~~(A) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes plus 15 % of the flight time planned to be spent at cruising level or 2 hours, whichever is less; or~~

~~(B) for aeroplanes with turbine engines, fuel to fly for 2 hours at normal cruise consumption above the destination aerodrome,~~

~~this should not be less than final reserve fuel; and~~

~~(v) extra fuel if required by the commander.~~

~~(2) The sum of:~~

~~(i) taxi fuel;~~

~~(ii) trip fuel from the departure aerodrome to the destination alternate aerodrome, via the predetermined point;~~

~~(iii) contingency fuel calculated in accordance with (a)(3);~~

~~(iv) additional fuel if required, but not less than:~~

~~(A) for aeroplanes with reciprocating engines: fuel to fly for 45 minutes; or~~

~~(B) for aeroplanes with turbine engines: fuel to fly for 30 minutes at holding speed at 1 500 ft (450 m) above the destination alternate aerodrome elevation in standard conditions,~~

~~this should not be less than final reserve fuel; and~~

~~(v) extra fuel if required by the commander.~~

~~(d) Isolated aerodrome procedure~~

~~If the operator's fuel policy includes planning to an isolated aerodrome, the last possible point of diversion to any available en-route alternate (ERA) aerodrome should be used as the predetermined point.~~

AMC2 CAT.OP.MPA.150(b) is deleted

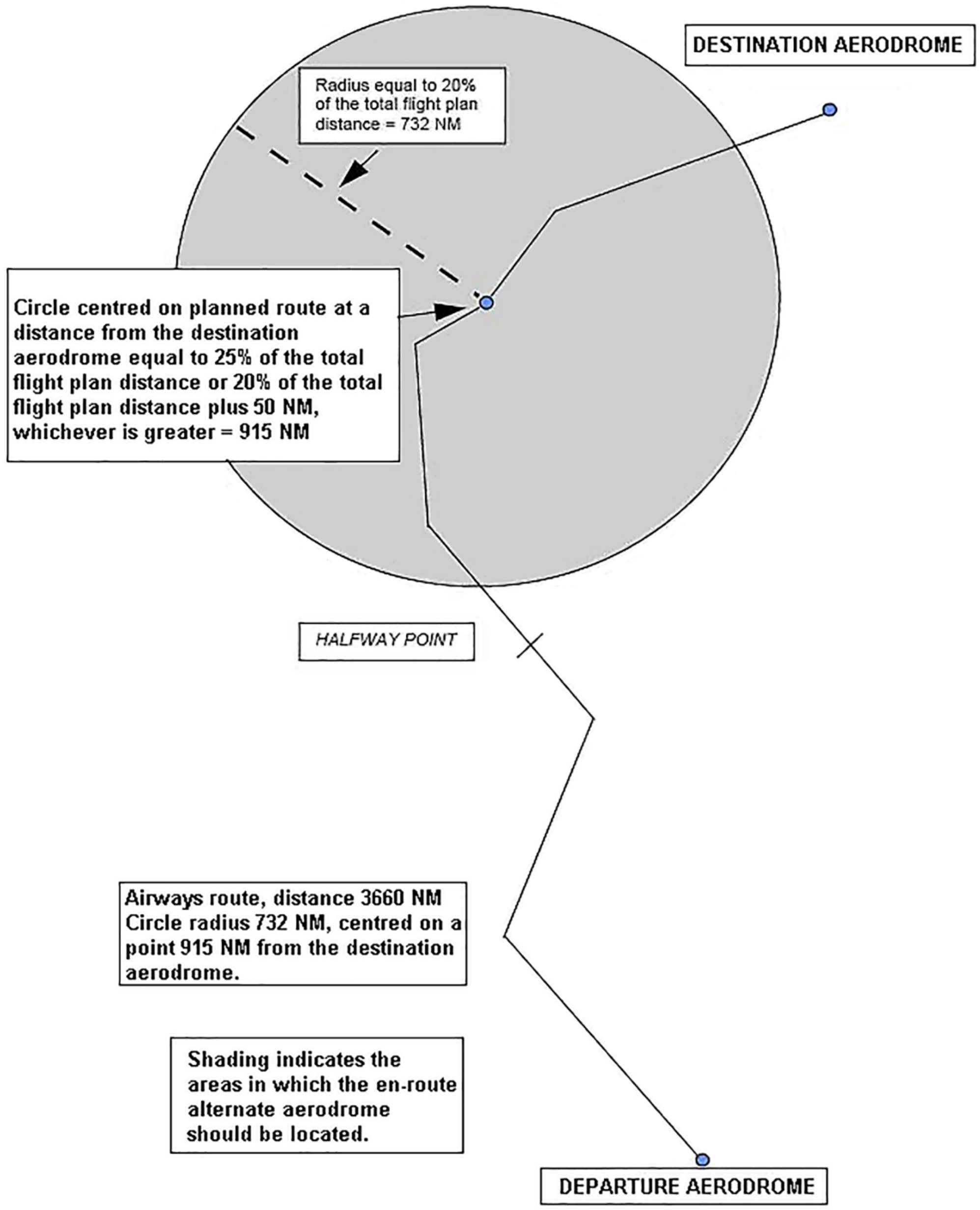
~~AMC2 CAT.OP.MPA.150(b) Fuel Policy~~

~~LOCATION OF THE FUEL EN-ROUTE ALTERNATE (FUEL ERA) AERODROME~~

~~(a) The fuel ERA aerodrome should be located within a circle having a radius equal to 20 % of the total flight plan distance, the centre of which lies on the planned route at a distance from the destination aerodrome of 25 % of the total flight plan distance, or at least 20 % of the total flight plan distance plus 50 NM, whichever is greater. All distances should be calculated in still air conditions (see Figure 1).~~

~~Figure 1~~

~~Location of the fuel ERA aerodrome for the purposes of reducing contingency fuel to 3 %~~



AMC3 CAT.OP.MPA.150(b) is deleted

~~AMC3 CAT.OP.MPA.150(b) Fuel Policy~~

~~PLANNING CRITERIA — HELICOPTERS~~

~~The operator should base the company fuel policy, including calculation of the amount of fuel to be carried, on the following planning criteria:~~

~~(a) The amount of:~~

~~(1) taxi fuel, which should not be less than the amount expected to be used prior to take-off. Local conditions at the departure site and APU consumption should be taken into account;~~

~~(2) trip fuel, which should include fuel:~~

~~(i) for take-off and climb from aerodrome elevation to initial cruising level/altitude, taking into account the expected departure routing;~~

(ii) from top of climb to top of descent, including any step climb/descent;

(iii) from top of descent to the point where the approach procedure is initiated, taking into account the expected arrival procedure; and

(iv) for approach and landing at the destination site;

(3) contingency fuel, which should be:

(i) for IFR flights, or for VFR flights in a hostile environment, 10 % of the planned trip fuel; or

(ii) for VFR flights in a non-hostile environment, 5 % of the planned trip fuel;

(4) alternate fuel, which should be:

(i) fuel for a missed approach from the applicable MDA/DH at the destination aerodrome to missed approach altitude, taking into account the complete missed approach procedure;

(ii) fuel for a climb from missed approach altitude to cruising level/altitude;

(iii) fuel for the cruise from top of climb to top of descent;

(iv) fuel for descent from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure;

(v) fuel for executing an approach and landing at the destination alternate selected in accordance with **CAT.OP.MPA.181**; and

(vi) for helicopters operating to or from helidecks located in a hostile environment, 10 % of (a)(4)(i) to (v);

(5) final reserve fuel, which should be:

(i) for VFR flights navigating by day with reference to visual landmarks, 20 minutes' fuel at best range speed; or

(ii) for IFR flights or when flying VFR and navigating by means other than by reference to visual landmarks or at night, fuel to fly for 30 minutes at holding speed at 1 500 ft (450 m) above the destination aerodrome in standard conditions calculated with the estimated mass on arrival above the alternate, or the destination, when no alternate is required;

and

(6) extra fuel, which should be at the discretion of the commander.

(b) Isolated aerodrome IFR procedure

If the operator's fuel policy includes planning to an isolated aerodrome flying IFR, or when flying VFR and navigating by means other than by reference to visual landmarks, for which a destination alternate does not exist, the amount of fuel at departure should include:

(1) taxi fuel;

(2) trip fuel;

(3) contingency fuel calculated in accordance with (a)(3);

(4) additional fuel to fly for 2 hours at holding speed, including final reserve fuel; and

(5) extra fuel at the discretion of the commander.

(c) Sufficient fuel should be carried at all times to ensure that following the failure of an engine occurring at the most critical point along the route, the helicopter is able to:

(1) descend as necessary and proceed to an adequate aerodrome;

(2) hold there for 15 minutes at 1 500 ft (450 m) above aerodrome elevation in standard conditions; and

(3) make an approach and landing.

GM1 CAT.OP.MPA.150(b) is deleted

~~GM1 CAT.OP.MPA.150(b) Fuel policy~~

~~CONTINGENCY FUEL STATISTICAL METHOD — AEROPLANES~~

~~(a) As an example, the following values of statistical coverage of the deviation from the planned to the actual trip fuel provide appropriate statistical coverage.~~

~~(1) 99 % coverage plus 3 % of the trip fuel, if the calculated flight time is less than 2 hours, or more than 2 hours and no weather-permissible ERA aerodrome is available.~~

~~(2) 99 % coverage if the calculated flight time is more than 2 hours and a weather-permissible ERA aerodrome is available.~~

~~(3) 90 % coverage if:~~

~~(i) the calculated flight time is more than 2 hours;~~

~~(ii) a weather-permissible ERA aerodrome is available; and~~

~~(iii) at the destination aerodrome two separate runways are available and usable, one of which is equipped with an ILS/MLS, and the weather conditions are in compliance with **CAT.OP.MPA.180(b)(2),** or the ILS/MLS is operational to CAT II/III operating minima and the weather conditions are at or above 500 ft.~~

~~(b) The fuel consumption database used in conjunction with these values should be based on fuel consumption monitoring for each route/aeroplane combination over a rolling 2-year period.~~

GM1 CAT.OP.MPA.150(c)(3)(i) is deleted

~~GM1 CAT.OP.MPA.150(c)(3)(i) Fuel policy~~

~~CONTINGENCY FUEL~~

~~Factors that may influence fuel required on a particular flight in an unpredictable way include deviations of an individual aeroplane from the expected fuel consumption data, deviations from forecast meteorological conditions and deviations from planned routings and/or cruising levels/altitudes.~~

GM1 CAT.OP.MPA.150(c)(3)(iI) is deleted

~~GM1 CAT.OP.MPA.150(c)(3)(ii) Fuel policy~~

~~DESTINATION ALTERNATE AERODROME~~

~~The departure aerodrome may be selected as the destination alternate aerodrome.~~

AMC 1 CAT.OP.MPA.175(a) is replaced by the following:

AMC1 CAT.OP.MPA.175(a) Flight preparation

OPERATIONAL FLIGHT PLAN — COMPLEX MOTOR-POWERED AIRCRAFT

(a) The operational flight plan used and the entries made during flight should contain the following items:

(1) aircraft registration;

(2) aircraft type and variant;

(3) date of flight;

(4) flight identification;

(5) names of flight crew members;

(6) duty assignment of flight crew members;

(7) place of departure;

(8) time of departure (actual off-block time, take-off time);

(9) place of arrival (planned and actual);

(10) time of arrival (actual landing and on-block time);

(11) type of operation (ETOPS, VFR, ferry flight, etc.);

(12) route and route segments with checkpoints/waypoints, distances, time and tracks;

(13) planned cruising speed and flying times between check-points/waypoints (estimated, revised and actual times overhead);

(14) safe altitudes and minimum levels;

(15) planned altitudes and flight levels;

(16) fuel calculations (records of in-flight fuel checks);

(17) fuel on board when starting engines;

(18) alternate(s) for destination, ~~and, where applicable, take-off and en-route,~~ including the information required in (a)(12) to (15), as well as destination 2 and destination 2 alternate aerodromes in case of a reduced contingency fuel (RCF) procedure;

(19) where applicable, a take-off alternate and fuel ERA aerodrome(s);

~~(19)~~(20) initial ATS flight plan clearance and subsequent reclearance;

~~(20)~~(21) in-flight replanning calculations; and

~~(21)~~(22) ~~relevant~~ meteorological information, as specified in point (a) of point MET.TR.215 of Part-MET.

(b) Items that are readily available in other documentation or from another acceptable source or are irrelevant to the type of operation may be omitted from the operational flight plan.

(c) The operational flight plan and its use should be described in the operations manual.

(d) All entries on the operational flight plan should be made concurrently and be permanent in nature.

OPERATIONAL FLIGHT PLAN — OTHER-THAN-COMPLEX MOTOR-POWERED AIRCRAFT OPERATIONS AND LOCAL OPERATIONS

(e) An operational flight plan may be established in a simplified form relevant to the ~~kind~~ type of operation for operations with other-than-complex motor-powered aircraft as well as local operations with any aircraft. Local operations should be defined in the OM.

OPERATIONAL FLIGHT PLAN — HELICOPTERS OPERATED WITH A SINGLE PILOT AND WITHOUT A STABILITY AUGMENTATION SYSTEM OR AN AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

(f) No entries should be made in the operational flight plan during the flight

OPERATIONAL FLIGHT PLAN PRODUCED BY A COMPUTERISED FLIGHT PLANNING SYSTEM

(g) When the operator uses a computerised flight planning system to produce an operational flight plan, the functionality of this system should be described in the OM.

(h) If the computerised flight planning system is used in conjunction with a basic fuel scheme with variations or an individual fuel scheme, the operator should ensure that the quality and the proper functionality of the software are tested after each upgrade. The test should verify that the changes to the software do not affect the final output.

The following AMC1 CAT.OP.MPA.177 is inserted:

AMC1 CAT.OP.MPA.177 Submission of the ATS flight plan

FLIGHTS WITHOUT AN ATS FLIGHT PLAN

(a) When unable to submit or close the ATS flight plan due to lack of ATS facilities or of any other means of communications to ATS, the operator should establish procedures, instructions, and a list of nominated persons to be responsible for alerting search and rescue (SAR) services.

(b) To ensure that each flight is located at all times, these instructions should:

(1) provide the nominated person with at least the information required to be included in a VFR flight plan, and the location, date, and estimated time for re-establishing communications;

(2) if an aircraft is overdue or missing, ensure that the appropriate ATS or SAR service is notified; and

(3) ensure that the information will be retained at a designated place until the completion of the flight.

The following AMC1 CAT.OP.MPA.180 is inserted:

AMC1 CAT.OP.MPA.180 Fuel/energy scheme - aeroplanes

INDIVIDUAL FUEL SCHEME

(a) Prior to submitting an individual fuel scheme for approval, the operator should perform all the following actions to establish a baseline safety performance:

(1) measure the baseline safety performance of its operation with the current fuel scheme by:

(i) selecting safety performance indicators (SPIs) and targets; and

(ii) collecting statistically relevant data for a period of at least 2 years of continuous operation (note: the number of flights should be sufficient to provide data to support the intended deviation);

(2) identify the hazards associated with the individual fuel scheme and carry out a safety risk assessment of these hazards; and

(3) based on this safety risk assessment, establish a mechanism for risk monitoring and risk control to ensure an equivalent level of safety to that of the current fuel scheme.

(b) In order to ensure the approval of the CAA and its continuous oversight, the operator should establish an effective continuous reporting system to the CAA on the safety performance and regulatory compliance of the individual fuel scheme.

(c) When determining the extent of the deviation from the current fuel scheme, the operator should take into account at least the following elements for the relevant area of operation:

(1) the available aerodrome technologies, capabilities, and infrastructure;

(2) the reliability of meteorological and aerodrome information;

(3) the reliability of the aeroplane systems, especially the time-limited ones; and

(4) the type of ATS provided and, where applicable, characteristics and procedures of the air traffic flow management and of the airspace management.

(d) An operator wishing to apply for the approval of an individual fuel scheme should be able to demonstrate that it exercises sufficient organisational control over internal processes and the use of resources. The operator should adapt its management system to ensure that:

(1) processes and procedures are established to support the individual fuel scheme;

(2) involved flight crew and personnel are trained and competent to perform their tasks; and

(3) the implementation and effectiveness of such processes, procedures, and training are monitored.

(e) The operator should have as a minimum the following operational capabilities that support the implementation of an individual fuel scheme:

(1) use a suitable computerised flight-planning system;

(2) ensure that the planning of flights is based upon current aircraft-specific data that is derived from a fuel consumption monitoring system and reliable meteorological data;

(3) have airborne fuel prediction systems;

(4) be able to operate in required navigation performance (RNP) 4 oceanic and remote continental airspace and in area navigation (RNAV) 1 continental en-route airspace, as applicable;

(5) be able to perform APCHs that require an LVO approval and RNP APCHs down to VNAV minima; and

(6) update the available landing options by establishing an operational control system with the following capabilities:

(i) flight monitoring or flight watch;

(ii) collection and continuous monitoring of reliable meteorological, aerodrome, and traffic information;

(iii) two independent airborne communications systems to achieve rapid and reliable exchange of relevant safety information between flight operations personnel and flight crew during the entire flight; and

(iv) monitoring of the status of aircraft systems that affect fuel consumption and of ground and aircraft systems that affect landing capabilities.

(f) After receiving the approval, the operator should:

(1) continually measure and monitor the outcome of each SPI; and

(2) in case of degradation of any SPI:

(i) assess the root cause of the degradation;

(ii) identify remedial actions to restore the baseline safety performance; and

(iii) when the associated safety performance target is not met, inform the CAA as soon as practicable.

The following GM1 CAT.OP.MPA.180 is inserted:

GM1 CAT.OP.MPA.180 Fuel/energy scheme - aeroplanes

FUEL SCHEMES

An operator can choose between three different fuel schemes. For the development of each fuel scheme, the following AMC are applicable:

(a) Basic fuel scheme: all the AMC that apply to the basic fuel scheme.

(b) Basic fuel scheme with variations: when an operator decides to deviate fully or partly from the basic fuel schemes, the AMC for basic fuel schemes with variations apply to the specific deviation.

(c) Individual fuel scheme: when an operator wishes to apply an individual fuel scheme, the AMC for the individual fuel scheme apply; for the part of the scheme where the operator still follows the basic fuel scheme, the operator should apply the AMC referred to in (a) and (b).

The following GM2 CAT.OP.MPA.180 is inserted:

GM2 CAT.OP.MPA.180 Fuel/energy scheme - aeroplanes

INDIVIDUAL FUEL SCHEMES – BASELINE SAFETY PERFORMANCE INDICATORS (SPIs) AND EQUIVALENT LEVEL OF SAFETY

(a) Establishing the baseline safety performance of a current fuel scheme involves collecting historical statistical data for the selected SPIs over a defined period of time, e.g. a minimum of 2 years. The safety performance of the operator’s processes is then measured against this baseline safety performance before and after implementation of the individual fuel scheme.

(b) Agreed SPIs should be commensurate with the complexity of the operational context, the extent of the deviations of the individual fuel scheme from the current fuel scheme, and the availability of resources to address those SPIs.

(c) The following is a non-exhaustive list of SPIs that are used to measure the baseline safety performance:

(1) flights with 100 % consumption of the contingency fuel;

(2) flights with a percentage consumption of the contingency fuel (e.g. 85 %), as agreed by the operator and the CAA;

(3) difference between planned and actual trip fuel;

(4) landings with less than the final reserve fuel/energy (FRF/energy) remaining;

(5) flights landing with less than minutes of fuel remaining (e.g. 45 minutes), as agreed by the operator and the CAA;

(6) ‘MINIMUM FUEL’ declarations;

(7) ‘MAYDAY MAYDAY MAYDAY FUEL’ declarations;

(8) in-flight re-planning to the planned destination due to fuel shortage, including committing to land at the destination by cancelling the planned destination alternate;

(9) diversion to an en-route alternate (ERA) aerodrome to protect the FRF/energy;

(10) diversion to the destination alternate aerodrome; and

(11) any other indicator with the potential of demonstrating the suitability or unsuitability of the alternate aerodrome and fuel planning policy. Note: Although the above-list includes quantitative SPIs, for certain non-data-based monitoring SPIs, alert and target levels may be qualitative in nature.

(d) Equivalent level of safety: SPIs and associated targets that are achieved after the introduction of an individual fuel scheme ‘should be equivalent to’ or ‘exceed’ the SPIs and associated targets that were used in the previously approved fuel scheme. To determine if such equivalence is achieved, the operator should carefully compare with one another the safety performance of operational activities before and after the application of the individual fuel scheme. For example, the operator should ensure that the average number of landings with less than the FRF/energy does not increase after the introduction of the individual fuel scheme.

(e) The applicability of the individual fuel scheme may be limited to a specific aircraft fleet or type/variant of aircraft or area of operations. Different policies may be established as long as the procedures clearly specify the boundaries of each policy so that the flight crew is aware of the policy being applied: for example, the operator may wish to deviate from the basic 5 % contingency fuel policy only in certain areas of operations or only for a specific aircraft fleet or type/variant of aircraft. The safety performance of the fuel scheme may be measured according to the relevant area of operation or aircraft fleet or type/variant of aircraft so that any degradation of the safety performance can be isolated and mitigated separately. In that case, the approval for a deviation may be suspended for the affected area of operations and/or type/variant of aircraft until the required safety performance is achieved.

Note: ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual* (1st Edition, 2015) and the *EASA Fuel Manual* provide further guidance.

The following GM3 CAT.OP.MPA.180 is inserted:

GM3 CAT.OP.MPA.180 Fuel/energy scheme - aeroplanes

INDIVIDUAL FUEL SCHEMES – OPERATOR CAPABILITIES – COMMUNICATIONS SYSTEMS

(a) In the context of point (e)(6) of AMC1 CAT.OP.MPA.180, the availability of two independent communications systems at dispatch is particularly relevant for flights over oceanic and remote areas (e.g. when flying over the ocean without VHF coverage, operators need either HF or satellite communications (SATCOM)).

(b) Consideration should also be given to the operational control system associated with the use of the aircraft communications addressing and reporting system (ACARS). Two communications systems (e.g. VHF and SATCOM) should be used to support the ACARS functionality to ensure the required degree of independence unless the operator has established contingency procedures for reverting to voice communication only.

(c) Additional means of communications may be required by other regulations that are not linked to fuel schemes.

Note: For further information, see ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual*, Appendix 7 to Chapter 5 *A performance-based approach job-aid for an approving authority* (1st Edition, 2015).

The following AMC1 CAT.OP.MPA.181 is inserted:

AMC1 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

BASIC FUEL SCHEME – PRE-FLIGHT CALCULATION OF USABLE FUEL FOR PERFORMANCE CLASS A AEROPLANES

For the pre-flight calculation of the usable fuel in accordance with point **CAT.OP.MPA.181**, the operator should:

(a) for taxi fuel, take into account the local conditions at the departure aerodrome and the APU consumption;

(b) for trip fuel, include:

(1) fuel for take-off and climb from the aerodrome elevation to the initial cruising level/altitude, taking into account the expected departure routing;

(2) fuel from the top of climb to the top of descent, including any step climb/descent;

(3) fuel from the top of descent to the point where the approach procedure is initiated, taking into account the expected arrival routing; and

(4) fuel for making an approach and landing at the destination aerodrome;

(c) for contingency fuel, calculate for unforeseen factors either:

(1) 5 % of the planned trip fuel or, in the event of in-flight re-planning, 5 % of the trip fuel for the remainder of the flight; or

(2) an amount to fly for 5 minutes at holding speed at 1 500 ft (450 m) above the destination aerodrome in standard conditions, whichever is the higher;

(d) for destination alternate fuel, include:

(1) when the aircraft is operated with one destination alternate aerodrome:

(i) fuel for a missed approach from the applicable DA/H or MDA/H at the destination aerodrome to the missed-approach altitude, taking into account the complete missed-approach procedure;

(ii) fuel for climb from the missed-approach altitude to the cruising level/altitude, taking into account the expected departure routing;

(iii) fuel for cruising from the top of climb to the top of descent, taking into account the expected routing;

(iv) fuel for descent from the top of descent to the point where the approach is initiated, taking into account the expected arrival routing; and

(v) fuel for making an approach and landing at the destination alternate aerodrome; and

(2) when the aircraft is operated with two destination alternate aerodromes, the amount of fuel that is calculated in accordance with point (d)(1), based on the destination alternate aerodrome that requires the greater amount of fuel;

(e) for FRF/energy, comply with point **CAT.OP.MPA.181(c);**

(f) for additional fuel, include an amount of fuel that allows the aeroplane to proceed, in the event of an engine failure or loss of pressurisation, from the most critical point along the route to a fuel en-route alternate (fuel ERA) aerodrome in the relevant aircraft configuration, hold there for 15 minutes at 1 500 ft (450 m) above the aerodrome elevation in standard conditions, make an approach, and land;

(g) for extra fuel, include anticipated delays or specific operational constraints that can be predicted; and

(h) for discretionary fuel, include a quantity at the sole discretion of the commander

The following AMC2 CAT.OP.MPA.181 is inserted:

AMC2 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

BASIC FUEL SCHEME – PRE-FLIGHT CALCULATION OF USABLE FUEL FOR PERFORMANCE CLASS B AND C AEROPLANES

The pre-flight calculation of required usable fuel should include:

(a) taxi fuel, if significant;

(b) trip fuel;

(c) contingency fuel that is not less than 5 % of the planned trip fuel, or in the event of in-flight replanning, 5 % of the trip fuel for the remainder of the flight;

(d) alternate fuel to reach the destination alternate aerodrome via the destination if a destination alternate aerodrome is required;

(e) FRF/energy to comply with point **CAT.OP.MPA.181(c);**

(f) extra fuel if there are anticipated delays or specific operational constraints; and

(g) discretionary fuel, if required by the commander.

The operating conditions may include rounded-up figures of fuel for all flights.

The following AMC3 CAT.OP.MPA.181 is inserted:

AMC3 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

BASIC FUEL SCHEME – PRE-FLIGHT CALCULATION OF USABLE FUEL FOR ELA2 AEROPLANES

For operations, take-off, and landing at the same aerodrome or operating site under VFR by day, operators should specify the minimum FRF/energy in the OM. This FRF/energy should not be less than the amount needed to fly for a period of 45 minutes. Taking account of the operating conditions, a single fuel figure may be selected for all flights. For the pre-flight calculation of the required usable fuel, a single rounded-up figure for the particular flight is needed, which includes trip fuel, contingency fuel, extra fuel, discretionary fuel, and alternate fuel, to reach a destination alternate aerodrome if such an aerodrome is required.

The following AMC4 CAT.OP.MPA.181 is inserted:

AMC4 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

BASIC FUEL SCHEME – PRE-FLIGHT CALCULATION OF USABLE FUEL

The additional fuel required by the type of operation in the event of an aircraft failure that significantly increases fuel consumption at the most critical point along the route should be calculated according to the engine failure or loss of pressurisation, whichever requires a greater amount of fuel.

The following AMC5 CAT.OP.MPA.181 is inserted:

AMC5 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS – TAXI FUEL

To calculate taxi fuel for a basic fuel scheme with variations, the operator may use statistical taxi fuel.

The following AMC6 CAT.OP.MPA.181 is inserted:

AMC6 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS – CONTINGENCY FUEL

(a) Contingency fuel variations are methods of reducing the basic amount of contingency fuel based on established mitigating measures.

(b) If the operator establishes and maintains a fuel consumption monitoring system for individual aeroplanes, and uses valid data for fuel calculation based on such a system, the operator may use any of the requirements in point (c) or (d) of this AMC to calculate the contingency fuel.

(c) The contingency fuel should be the fuel described in points (c)(1) or (c)(2) of this AMC, whichever is higher:

(1) an amount of fuel that should be either:

(i) not less than 3 % of the planned trip fuel, or in the event of in-flight re-planning, 3 % of the trip fuel for the remainder of the flight provided that a fuel en-route alternate (fuel ERA) aerodrome is available; or

(ii) an amount of fuel sufficient for 20-minute flying time based upon the planned trip fuel consumption; or

(iii) an amount of fuel based on a statistical fuel method that ensures an appropriate statistical coverage of the deviation from the planned to the actual trip fuel; prior to implementing a statistical fuel method, a continuous 2-year operation is required during which statistical contingency fuel (SCF) data is recorded — note: to use SCF on a particular city pair/aeroplane combination, sufficient data is required to be statistically significant; the operator should use this method to monitor the fuel consumption on each city pair/aeroplane combination, and to carry out a statistical analysis to calculate the required contingency fuel for that city pair/aeroplane combination; or

(2) an amount of fuel to fly for 5 minutes at holding speed at 1 500 ft (450 m) above the destination aerodrome in standard conditions.

(d) RCF procedure: if the operator's fuel policy includes pre-flight planning to a destination 1 aerodrome (commercial destination with an RCF procedure using a decision point along the route) and a destination 2 aerodrome (optional refuelling destination), the amount in the preflight calculation of the required usable fuel should be greater than the sum in points (d)(1) or (d)(2):

(1) the sum of:

(i) taxi fuel;

(ii) trip fuel to the destination 1 aerodrome via the decision point;

(iii) contingency fuel equal to not less than 5 % of the fuel that is estimated to be consumed from the decision point to the destination 1 aerodrome;

(iv) the amount of fuel specified in AMC2 CAT.OP.MPA.182: destination 1 alternate fuel or no alternate fuel if the remaining flying time from the decision point to destination 1 aerodrome is less than 6 hours;

(v) for FRF/energy, comply with CAT.OP.MPA.181 (c)(5);

(vi) additional fuel;

(vii) extra fuel if there are anticipated delays or specific operational constraints; and

(viii) discretionary fuel, if required by the commander; or

(2) the sum of:

(i) taxi fuel;

(ii) trip fuel to the destination 2 aerodrome via the decision point;

(iii) contingency fuel equal to not less than the amount that is calculated in accordance with point (c) of this AMC, from the departure aerodrome to the destination 2 aerodrome;

(iv) alternate fuel if a destination 2 alternate aerodrome is required;

(v) FRF/energy;

(vi) additional fuel;

(vii) extra fuel if there are anticipated delays or specific operational constraints; and

(viii) discretionary fuel, if required by the commander.

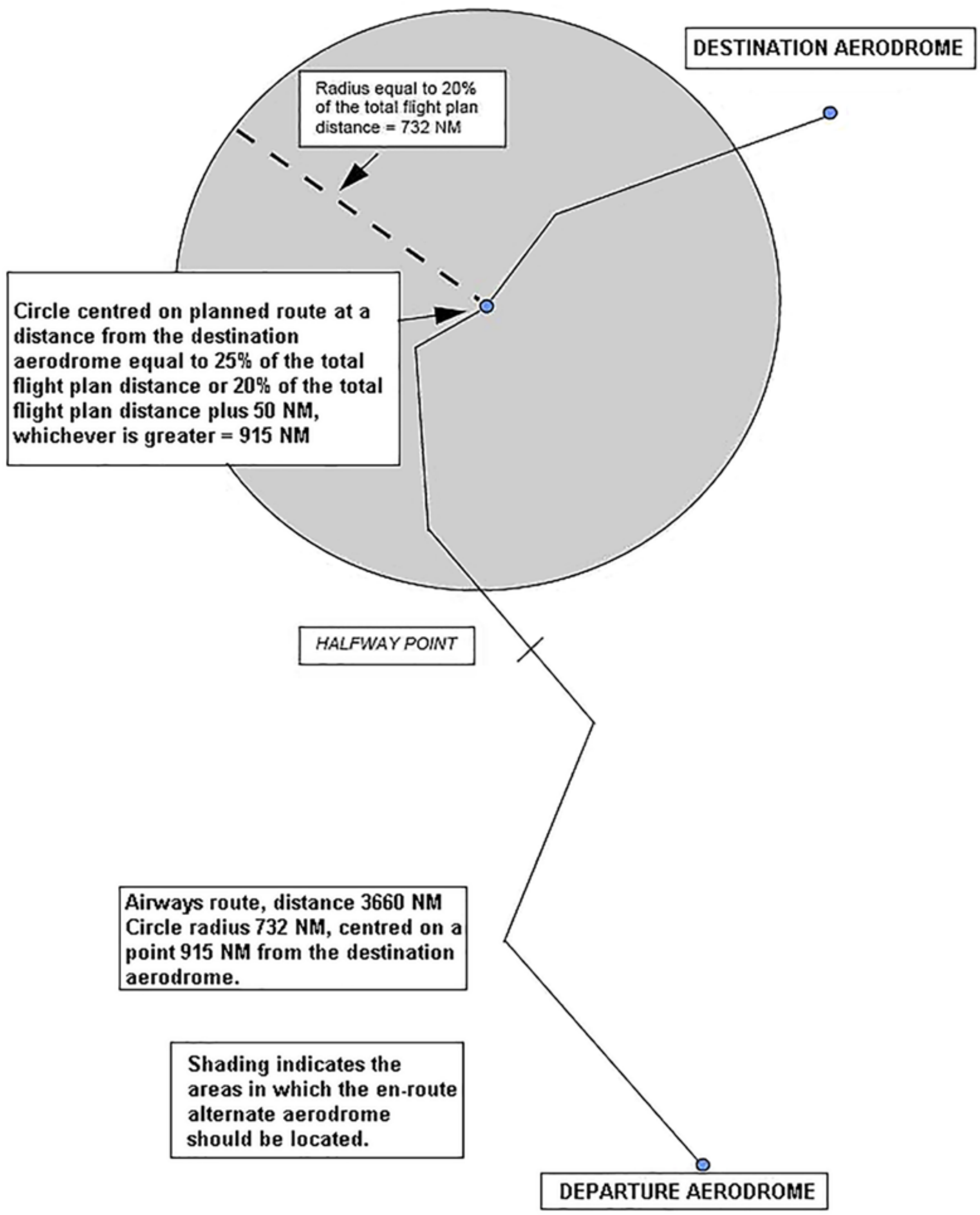
The following AMC7 CAT.OP.MPA.181 is inserted:

AMC7 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS – LOCATION OF THE FUEL EN-ROUTE ALTERNATE AERODROME TO REDUCE CONTINGENCY FUEL TO 3%

The fuel en-route alternate (fuel ERA) aerodrome should be located within a circle with a radius equal to 20 % of the total flight plan distance; the centre of this circle lies on the planned route at a distance from the destination aerodrome equal to 25 % of the total flight plan distance, or at least 20 % of the total flight plan distance plus 50 NM, whichever is greater. All distances should be calculated in still-air conditions (see Figure 1). The fuel ERA aerodrome should be nominated in the operational flight plan.

Figure 1 — Location of the fuel ERA aerodrome to reduce contingency fuel to 3 %



The following AMC8 CAT.OP.MPA.181 is inserted:

AMC8 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

INDIVIDUAL FUEL SCHEME – FUEL CONSUMPTION MONITORING SYSTEM

A fuel consumption monitoring system should be data driven, and should include the following:

(a) a fuel performance monitoring system;

(b) a database that contains statistically significant data of at least 2 years;

(c) statistics and data normalisation; and

(d) data transparency and verification.

The following GM1 CAT.OP.MPA.181 is replaced.

~~GM1 CAT.OP.MPA.181 Selection of aerodromes and operating sites — helicopters~~

~~LANDING FORECAST~~

~~(a) Meteorological data have been specified that conform to the standards contained in the Regional Air Navigation Plan and ICAO Annex 3. As the following meteorological data are point-specific, caution should be exercised when associating it with nearby aerodromes (or helidecks).~~

~~(b) Meteorological reports (METARs)~~

~~(1) Routine and special meteorological observations at offshore installations should be made during periods and at a frequency agreed between the meteorological authority and the operator concerned. They should comply with the provisions contained in the meteorological section of the ICAO Regional Air Navigation Plan, and should conform to the standards and recommended practices, including the desirable accuracy of observations, promulgated in ICAO Annex 3.~~

~~(2) Routine and selected special reports are exchanged between meteorological offices in the METAR or SPECI (aviation selected special weather report) code forms prescribed by the World Meteorological Organisation.~~

~~(c) Aerodrome forecasts (TAFs)~~

~~(1) The aerodrome forecast consists of a concise statement of the mean or average meteorological conditions expected at an aerodrome or aerodrome during a specified period of validity, which is normally not less than 9 hours, or more than 24 hours in duration. The forecast includes surface wind, visibility, weather and cloud, and expected changes of one or more of these elements during the period. Additional elements may be included as agreed between the meteorological authority and the operators concerned. Where these forecasts relate to offshore installations, barometric pressure and temperature should be included to facilitate the planning of helicopter landing and take-off performance.~~

~~(2) Aerodrome forecasts are most commonly exchanged in the TAF code form, and the detailed description of an aerodrome forecast is promulgated in the ICAO Regional Air Navigation Plan and also in ICAO Annex 3, together with the operationally desirable accuracy elements. In particular, the observed cloud height should remain within ±30 % of the forecast value in 70 % of cases, and the observed visibility should remain within ±30 % of the forecast value in 80 % of cases.~~

~~(d) Landing forecasts (TRENDS)~~

~~(1) The landing forecast consists of a concise statement of the mean or average meteorological conditions expected at an aerodrome or aerodrome during the two-hour period immediately following the time of issue. It contains surface wind, visibility, significant weather and cloud elements and other significant information, such as barometric pressure and temperature, as may be agreed between the meteorological authority and the operators concerned.~~

~~(2) The detailed description of the landing forecast is promulgated in the ICAO Regional Air Navigation Plan and also in ICAO Annex 3, together with the operationally desirable accuracy of the forecast elements. In particular, the value of the observed cloud height and visibility elements should remain within ±30 % of the forecast values in 90 % of the cases.~~

~~(3) Landing forecasts most commonly take the form of routine or special selected meteorological reports in the METAR code, to which either the code words 'NOSIG', i.e. no significant change expected;~~

~~'BECMG' (becoming), or 'TEMPO' (temporarily), followed by the expected change, are added. The 2-hour period of validity commences at the time of the meteorological report.~~

GM1 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

BASIC FUEL SCHEME

TAXI FUEL — LOCAL CONDITIONS

(a) Local conditions, as referred to in point (a) of AMC1 CAT.OP.MPA.181, include NOTAMs, meteorological conditions (e.g. winter operations), ATS procedures (e.g. LVP, collaborative decision-making (CDM)), and any anticipated delay(s).

PLANNING OF FLIGHTS

(b) A flight should be planned by using the most accurate information available. If aircraft-specific data that is derived from a fuel consumption monitoring system is available, this data is used in preference to data that is provided by the aircraft manufacturer. Data that is provided by the aircraft manufacturer should be used only in specific cases, e.g. when introducing a new aircraft type into service.

FUEL CONSUMPTION MONITORING SYSTEM

(c) Extensive guidance on a fuel consumption monitoring system is provided in ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual*, Appendix 5 to Chapter 5 *Example of a fuel consumption monitoring (FCM) programme* (1st Edition, 2015). As a basic requirement, the fuel consumption monitoring system (commonly referred to as 'hull-specific fuel bias') is a process of comparing an aeroplane's achieved in-flight performance to an aeroplane's predicted performance. Variations between the achieved performance and the predicted performance result in a variation of the fuel consumption rate, which should be accounted for by the operator during flight planning and in-flight re-planning.

The fuel consumption monitoring system is used to determine an individual aeroplane's performance in comparison with its predicted one. In no case, should data that is collected from one aeroplane be used as a basis for varying another aeroplane's performance figures away from the predicted values.
The data that is collected and used to determine an aeroplane's actual performance should be collected in a manner acceptable to the CAA. The operator should demonstrate that the data collected during in-service operation of the aeroplane is accurate. Where possible, the data should be collected automatically; however, manual recording of data does not preclude an operator from participating in a fuel consumption monitoring system.

ANTICIPATED MASSES — LAST-MINUTE CHANGES

(d) Where appropriate, the operating procedures should include means to revise the fuel quantity and define limits to zero fuel weight (ZFW) changes, beyond which a new operational flight plan should be calculated.

TRIP FUEL — ARRIVAL ROUTING

(e) POINT MERGE PATTERN

When planning for a STAR to point merge, fuel for the direct STAR to the point merge should be included in the trip fuel. The fuel required to account for the probability that part of or the entire point merge route needs to be flown may be included in the contingency fuel unless there is an anticipated delay, in which case, the fuel required for the route should be included in the extra fuel.

(f) POINT TROMBONE PATTERN

When planning for a STAR or transition including a trombone pattern, fuel for the reasonably expected route should be included in the trip fuel. The fuel required to account for the probability that an extended part of or the entire trombone pattern route needs to be flown may be included in the contingency fuel unless there is an anticipated delay, in which case, the fuel required for the trombone pattern route should be included in the extra fuel.

UNFORESEEN FACTORS

(g) According to its definition, contingency fuel is the amount of fuel required to compensate for unforeseen factors. Unforeseen factors are those that could have an influence on the fuel consumption to the destination aerodrome, such as deviations of an individual aeroplane from the expected fuel consumption data, deviations from forecast meteorological conditions, extended unexpected delays in flight, extended unexpected taxi times, and deviations from planned routings and/or cruising levels.

Unforeseen factors may differ based on the type of fuel scheme adopted by each operator; the higher the capability of the operator, the fewer unforeseen factors there may be.

For example, operators that have a fuel consumption monitoring system should calculate the trip fuel based on the individual fuel consumption. Extended unexpected delays or deviations from forecast meteorological conditions are mitigated by means of statistical data.

DESTINATION ALTERNATE AERODROME

(h) The departure aerodrome may be selected as the destination alternate aerodrome.

FINAL RESERVE FUEL

(i) The operator may determine conservative (rounded-up) FRF/energy values for each type and variant of aeroplane that is used in operations. The intent of this recommendation is:

(1) to provide a reference value for comparing to pre-flight fuel planning computations, and for the purpose of a ‘gross error’ check; and

(2) to provide flight crews with easily referenced and recallable FRF/energy figures to support in-flight fuel monitoring and decision-making activities.

ANTICIPATED DELAYS

(j) In the context of fuel schemes, an anticipated delay is defined as one that can be predicted based on the information that is provided by the State of the aerodrome and/or ATS provider before the flight commences. For example, restrictions due to scheduled maintenance work on a runway are likely to cause a delay to the normal flow of inbound traffic. That delay may be promulgated either through NOTAMs or via the aeronautical information publication (AIP), including a specific time and/or date.

Another example is an ATS procedure that requires an operator to fly longer routes, e.g. due to curfew during night-time.

DISCRETIONARY FUEL

(k) Discretionary fuel is defined as 'fuel at the sole discretion of the commander' (PIC). The commander's discretion over the amount of fuel to be carried is independent and cannot be encouraged or discouraged.

IN-FLIGHT RE-PLANNING

(l) In the context of fuel policy, in-flight re-planning means voluntarily changing the destination aerodrome, any alternate aerodrome, or the remainder of the route after the flight commences, even when the flight can be completed as originally planned. In-flight re-planning has a broader sense than being obliged to change the intended course of action due to safety issues (remaining fuel, failures, bad weather conditions, etc.). In-flight re-planning allows the operator to modify the filed flight plan after flight commencement for commercial or other reasons. However, the modified flight plan should fulfil all requirements of a new flight plan. The use of en-route alternate (ERA) aerodromes to save fuel should comply with the in-flight re-planning requirements.

In-flight re-planning should not apply when the aircraft no longer continues via the flight plan route to the intended destination for reasons that could not be anticipated. In such cases, the in-flight fuel management policy dictates the commander's course of action.

The following GM2 CAT.OP.MPA.181 is inserted:

GM2 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS – STATISTICAL CONTINGENCY FUEL METHOD

As an example of statistical contingency fuel, the following statistical values of the deviation from the planned to the actual trip fuel provide appropriate statistical coverage:

(a) 99 % coverage plus 3 % of the trip fuel if the calculated flight time:

(1) is less than 2 hours; or

(2) is more than 2 hours and no fuel ERA aerodrome is available;

(b) 99 % coverage if the calculated flight time is more than 2 hours and a fuel ERA aerodrome is available; and

(c) 90 % coverage if:

(1) the calculated flight time is more than 2 hours;

(2) a fuel ERA aerodrome is available; and

(3) at the destination aerodrome, two separate runways are available and usable, one of which is suitable for type B instrument approach operations, and the meteorological conditions are in accordance with point **CAT.OP.MPA.182(e).**

The following GM3 CAT.OP.MPA.181 is inserted:

GM3 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

INDIVIDUAL FUEL SCHEME – FUEL CONSUMPTION MONITORING SYSTEM

More information can be found in ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual*, Appendix 5 to Chapter 5

The following GM4 CAT.OP.MPA.181 is inserted:

GM4 CAT.OP.MPA.181 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy - aeroplanes

INDIVIDUAL FUEL SCHEME – ANTICIPATED METEOROLOGICAL CONDITIONS

When determining the extent of the deviation in the area of operation, the operator should monitor the reliability of the meteorological forecast reports. The CAA should consider restricting or even not allowing a deviation when reliable meteorological information is not available. To this end, tools to predict and improve the reliability of the meteorological forecast reports may be explored to allow for the intended deviation.

The following AMC1 CAT.OP.MPA.182 is replaced by the following:

AMC1 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes ~~Destination aerodromes — instrument approach operations~~

BASIC FUEL SCHEME – TAKE-OFF ALTERNATE AERODROME ~~**PBN OPERATIONS**~~

~~The pilot-in-command should only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.~~

The take-off alternate aerodrome should not be farther from the departure aerodrome than:

(a) for two-engined aeroplanes:

(1) 1-hour flight time at an one-engine-inoperative (OEI) cruising speed according to the AFM in ISA and still-air conditions using the actual take-off mass; or

(2) the extended-range twin operations (ETOPS) diversion time that is approved in accordance with Subpart F of Annex V (Part-SPA) to **UK Regulation (EU) No 965/2012**, subject to any minimum equipment list (MEL) restriction, up to a maximum of 2-hour flight time at OEI cruising speed according to the AFM in ISA and still-air conditions using the actual take-off mass; and

(b) for three- or four-engined aeroplanes, 2-hour flight time at an all-engines-operating cruising speed according to the AFM in ISA and still-air conditions using the actual take-off mass;

(c) for operations approved in accordance with Annex V (Part-SPA), Subpart L *SINGLE-ENGINED TURBINE AEROPLANE OPERATIONS AT NIGHT OR IN IMC (SET-IMC),* 30 minutes flying time at normal cruising speed in still-air conditions, based on the actual take-off mass;

(d) in the case of multi-engined aeroplanes, if the AFM does not contain an OEI cruising speed, the speed to be used for calculation shall be that which is achieved with the remaining engine(s) set at maximum continuous power.

The following AMC2 CAT.OP.MPA.182 is inserted:

AMC2 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS – NO DESTINATION ALTERNATE AERODROME

(a) For each IFR flight, the operator should select and specify in the operational and ATS flight plans at least one destination alternate aerodrome.

(b) For each IFR flight, the operator should select and specify in the operational and ATS flight plans two destination alternate aerodromes when for the selected destination aerodrome, the safety margins for meteorological conditions of **AMC5 CAT.OP.MPA.182**, and the planning minima of **AMC6 CAT.OP.MPA.182** cannot be met, or when no meteorological information is available.

(c) The operator may operate with no destination alternate aerodrome when the destination aerodrome is an isolated aerodrome or when the following two conditions are met:

(1) the duration of the planned flight from take-off to landing does not exceed 6 hours or, in the event of in-flight re-planning, in accordance with point **CAT.OP.MPA.181(d),** the remaining flying time to destination does not exceed 4 hours; and

(2) two separate runways are usable at the destination aerodrome and the appropriate weather reports and/or weather forecasts indicate that for the period from 1 hour before to 1 hour after the expected time of arrival, the ceiling is at least 2 000 ft (600 m) or the circling height + 500 ft (150 m), whichever is greater, and ground visibility is at least 5 km.

The following AMC3 CAT.OP.MPA.182 is inserted:

AMC3 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME – AERODROME FORECAST METEOROLOGICAL CONDITIONS

Table 1 — Aerodrome forecasts (TAFs) and landing forecasts (TRENDs) to be used for pre-flight planning

APPLICATION OF AERODROME FORECASTS (TAF AND TREND) TO PRE-FLIGHT PLANNING

(a) APPLICATION OF INITIAL PART OF TAF

(1) Application period: from the start of the TAF validity period to the time of applicability of the first subsequent 'FM…*' or 'BECMG', or if no 'FM…' or 'BECMG' is given, to the end of the validity period of the TAF.

(2) Application of forecast: the forecast of the prevailing weather conditions in the initial part of the TAF should be fully applied, with the exception of **mean wind** and **gusts** that should be applied in accordance with the policy under column 'BECMG AT and FM…' in the table below. However, this may be temporarily superseded by a 'TEMPO' or 'PROB**', if applicable according to the table below.

(b) APPLICATION OF FORECAST FOLLOWING CHANGE INDICATION IN THE TAF AND TREND

TAF or TREND for AERODROME PLANNED AS:	**FM…** (alone) and **BECMG AT**:	**BECMG** (alone), **BECMG FM**, **BECMG TL**, **BECMG FM… TL**, in case of:		**TEMPO** (alone), **TEMPO FM**, **TEMPO FM… TL**, **PROB 30/40** (alone)			**PROB TEMPO**
	Deterioration and improvement	**Deterioration**	**Improvement**	**Deterioration**		**Improvement**	**Deterioration and improvement**
				Transient/shower conditions in connection with short-lived weather phenomena, e.g. thunderstorms, showers	**Persistent conditions** in connection with e.g. haze, mist, fog, dust storm/sandstorm, continuous precipitations	In any case	
DESTINATION at ESTIMATE	Applicable from the **start of**	Applicable from the **start of change**	Applicable from the **end of change**	Not applicable	Applicable		Deterioration may be

D TIME OF ARRIVAL (ETA) ± 1 HR **TAKE-OFF ALTERNATE**	**change** **Mean wind** should be within	**Mean wind** should be within	**Mean wind** should be within	**Mean wind and gusts** exceeding required	**Mean wind** should be within required limits	Should be disregarded	disregarded. Improvement should be disregarded including mean

at ETA ± 1 HR **DESTINATION ALTERNATE** at ETA ± 1 HR **FUEL ERA** at ETA ± 1 HR	required limits **Gusts** exceeding crosswind limits should be fully applied	required limits **Gusts** exceeding crosswind limits should be fully applied	required limits **Gusts** exceeding crosswind limits should be fully applied	limits may be disregarded	**Gusts** exceeding crosswind limits should be fully applied		wind and gusts.
ETOPS ERA From earliest ETA to ETA + 1 HR	Applicable from the **start** of change	Applicable from the **start** of change	Applicable from the **end** of change	**Applicable if below applicable landing minima**	**Applicable if below applicable landing minima**		
	Mean wind should be within required limits	**Mean wind** should be within required limits	**Mean wind** should be within required limits	**Mean wind** should be within required limits	**Mean wind** should be within required limits		
	Gusts exceeding crosswind limits should be fully applied	**Gusts** exceeding crosswind limits should be fully applied	**Gusts** exceeding crosswind limits should be fully applied	**Gusts** exceeding limits crosswind should be fully applied	**Gusts** exceeding limits crosswind should be fully applied		

* The space following 'FM' should always include a time group, e.g. FM1030.

Note 1: 'required limits' are those contained in the OM.

Note 2: if promulgated aerodrome forecasts do not comply with the provisions of ICAO Annex 3, operators should ensure that guidance on the application of these reports is provided.

Note 3: for the definitions of the meteorological terms used in this table, see ICAO Annex 3.

The following AMC4 CAT.OP.MPA.182 is inserted:

AMC4 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME – REACHING THE DESTINATION AERODROME

In the context of the basic fuel scheme and basic fuel scheme with variations, 'reaching the destination' means the point at which the aircraft has reached the applicable DA/H or MDA/H at the destination aerodrome.

The following AMC5 CAT.OP.MPA.182 is inserted:

AMC5 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME – SAFETY MARGINS FOR METEOROLOGICAL CONDITIONS

(a) The operator should only select an aerodrome as:

(1) take-off alternate aerodrome; or

(2) destination aerodrome when the appropriate weather reports and/or forecasts indicate that during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the applicable landing minima as follows:

(i) RVR or VIS specified in accordance with point CAT.OP.MPA.110; and

(ii) for a type A or a circling operation, ceiling at or above MDH.

(b) The operator should only select an aerodrome as:

(1) destination alternate aerodrome;

(2) fuel ERA aerodrome; or

(3) isolated destination aerodrome when the appropriate weather reports and/or forecasts indicate that during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the planning minima.

(c) For the take-off alternate aerodrome and isolated destination aerodrome, any limitations related to OEI operations should be taken into account.

The following AMC6 CAT.OP.MPA.182 is inserted:

AMC6 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME – PLANNING MINIMA

The operator should select an aerodrome as:

(a) destination alternate aerodrome;

(b) fuel ERA aerodrome; or

(c) isolated destination aerodrome only when the appropriate weather reports and/or forecasts indicate that the weather conditions will be at or above the planning minima of Table 2 below (any limitations related to OEI operations are also taken into account):

Table 2 — Basic fuel scheme — planning minima — aeroplanes
Destination alternate aerodrome, fuel ERA aerodrome, isolated destination aerodrome

Type of approach operation	**Aerodrome ceiling (cloud base or vertical visibility)**	**RVR/VIS**
Type B instrument approach operations	DA/H + 200 ft	RVR/VIS + 800 m
Type A instrument approach operations	DA/H or MDA/H + 400 ft	RVR/VIS + 1 500 m
Circling approach operations	MDA/H + 400 ft	VIS + 1 500 m
Crosswind planning minima: see Table 1 of AMC3 CAT.OP.MPA.182		
Wind limitations should be applied taking into account the runway condition (dry, wet, contaminated).		

The following AMC7 CAT.OP.MPA.182 is inserted:

AMC7 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS – ISOLATED AERODROME – POINT OF NO RETURN

(a) Unless destination alternate fuel is carried, the operator should regard a destination aerodrome as an isolated aerodrome if the alternate fuel plus the FRF/energy that is required to reach the nearest adequate destination alternate aerodrome is more than:

(1) for aeroplanes with reciprocating engines, the amount of fuel required to fly either for 45 minutes plus 15 % of the flying time planned for cruising, including FRF/energy or for 2 hours, whichever is less; or

(2) for turbine-engined aeroplanes, the amount of fuel required to fly for 2 hours with normal cruise consumption above the destination aerodrome, including the FRF/energy.

(b) If the operator's fuel planning policy includes an isolated aerodrome, a PNR should be determined by a computerised flight-planning system and specified in the operational flight plan. The required usable fuel for pre-flight calculation should be as indicated in points (b)(1) or (b)(2), whichever is greater:

(1) the sum of:

(i) taxi fuel;

(ii) trip fuel from the departure aerodrome to the isolated aerodrome via the PNR;

(iii) contingency fuel that is calculated in accordance with the operator's current fuel scheme;

(iv) additional fuel, if required, but not less than:

(A) for aeroplanes with reciprocating engines, the fuel to fly either for 45 minutes plus 15 % of the flight time planned for cruising or for 2 hours, whichever is less; or

(B) for turbine-engined aeroplanes, the fuel to fly for 2 hours with normal cruise consumption above the destination aerodrome, including the FRF/energy;

(v) extra fuel if there are anticipated delays or specific operational constraints; and

(vi) discretionary fuel, if required by the commander; or

(2) the sum of:

(i) taxi fuel;

(ii) trip fuel from the departure aerodrome to the fuel ERA PNR aerodrome via the PNR;

(iii) contingency fuel that is calculated in accordance with the operator's current fuel scheme;

(iv) additional fuel, if required, but not less than:

(A) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes; or

(B) for turbine-engined aeroplanes, fuel to fly for 30 minutes at holding speed at 1 500 ft (450 m) above the fuel ERA aerodrome elevation in standard conditions, which should not be less than the FRF/energy;

(v) extra fuel if there are anticipated delays or specific operational constraints; and

(vi) discretionary fuel, if required by the commander.

The following AMC8 CAT.OP.MPA.182 is inserted:

AMC8 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS – PLANNING MINIMA

(a) Variations to the basic fuel schemes in the selection of aerodromes in regard to the planning minima are methods to reduce the meteorological margins based on the established mitigating measures.

(b) As a minimum, the operator should:

(1) use a suitable computerised flight-planning system; and

(2) have established an operational control system that includes flight monitoring.

(c) In addition:

(1) the duration of the planned flight from take-off to landing does not exceed 6 hours or, in the event of in-flight re-planning, in accordance with point **CAT.OP.MPA.181(d),** the remaining flying time to destination does not exceed 4 hours; and

(2) the planned flight should have a minimum flight crew of two pilots.

(d) Additionally, the operator should select an aerodrome as:

(1) a destination alternate aerodrome, or

(2) a fuel ERA aerodrome, only when the appropriate weather reports and/or forecasts indicate that the weather conditions will be at or above the planning minima of Table 3 below.

Table 3 —Basic fuel scheme with variations — planning minima — aeroplanes

Destination alternate aerodrome, fuel ERA aerodrome

Row	**Type of approach operation**	**Aerodrome ceiling (cloud base or vertical visibility)**	**RVR/VIS**
1	Type B instrument approach operations	DA/H + 200 ft	RVR/VIS + 550 m
2	3D Type A instrument approach operations, based on a facility with a system minimum of 200 ft or less	DA/H* + 200 ft	RVR/VIS** + 800 m
3	Two or more usable type A instrument approach operations***, each based on a separate navigation aid	DA/H* + 200 ft	RVR/VIS** + 1 000 m
4	Other type A instrument approach operations	DA/H or MDA/H + 400 ft	RVR/VIS + 1 500 m
5	Circling approach operations	MDA/H + 400 ft	VIS + 1 500 m
Crosswind planning minima: see Table 1 of AMC3 CAT.OP.MPA.182			
Wind limitations should be applied taking into account the runway condition (dry, wet, contaminated).			

* The higher of the usable DA/H or MDA/H.

** The higher of the usable RVR or VIS.

*** Compliance with point CAT.OP.MPA.182(f) should be ensured.

Note: The operator may select the most convenient planning minima row. For example, aerodrome with two type A approaches: one ILS CAT I (DA 350 ft/DH250 ft/550 m) another VOR/DME (MDA 650 ft/1 500 m). The operator may use Row 2 instead of Row 3.

The following AMC9 CAT.OP.MPA.182 is inserted:

AMC9 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS – PLANNING MINIMA

(a) Variations to the basic fuel schemes in the selection of aerodromes in regard to the planning minima are methods to reduce the meteorological margins based on the established mitigating measures.

(b) As a minimum, the operator should:

(1) use a suitable computerised flight-planning system;

(2) hold an approval for low-visibility approach operations for that fleet; and

(3) have established an operational control system that includes flight monitoring.

(c) Additionally, the operator should select an aerodrome as:

(1) destination alternate aerodrome;

(2) fuel ERA aerodrome; or

(3) isolated destination aerodrome only when the appropriate weather reports and/or forecasts indicate that the weather conditions will be at or above the planning minima of Table 4 below.

Table 4 — Basic fuel scheme with variations — planning minima

Destination alternate aerodrome, fuel ERA aerodrome, isolated destination aerodrome

Row	**Type of approach**	**Aerodrome ceiling (cloud base or vertical VIS)**	**RVR/VIS**
1	Two or more usable type B instrument approach operations to two separate runways***	DA/H* + 100 ft	RVR** + 300 m
2	One usable type B instrument approach operation	DA/H + 150 ft	RVR + 450 m
3	3D Type A instrument approach operations, based on a facility with a system minimum of 200 ft or less	DA/H + 200 ft	RVR/VIS** + 800 m
4	Two or more usable type A instrument approach operations ***, each based on a separate navigation aid	DA/H or MDA/H* + 200 ft	RVR/VIS** + 1 000 m
5	One usable type A instrument approach operation	DA/H or MDA/H + 400 ft	RVR/VIS + 1 500 m
6	Circling approach operations	MDA/H + 400 ft	VIS + 1 500 m
Crosswind planning minima: see Table 1 of AMC3 CAT.OP.MPA.182			
Wind limitations should be applied taking into account the runway condition (dry, wet, contaminated).			

* The higher of the usable DA/H or MDA/H.

** The higher of the usable RVR or VIS.

*** Compliance with point CAT.OP.MPA.182(f) should be ensured.

Note*:* The operator may select the most convenient planning minima row. For example, aerodrome with two type B approaches: one CAT3 (0 ft/75 m) another CAT1 (200 ft/550 m). The operator may use Row 2 and use CAT3 (0 + 150 ft/75 + 450 m) instead of Row 1 CAT1 (200 + 100 ft/550 + 300 m).

The following GM1 CAT.OP.MPA.182 is inserted:

GM1 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME

SAFE-LANDING OPTIONS

(a) Point **CAT.OP.MPA.182** sets out the safety objectives of the selection of aerodromes policy. This GM expands on the intent of that provision.

ONE SAFE-LANDING OPTION

(b) Point **CAT.OP.MPA.182(a)** requires the fuel planning and in-flight re-planning policy to ensure that the aircraft can always proceed to at least one aerodrome where landing is possible, even in abnormal operational conditions. This may require additional fuel (point **CAT.OP.MPA.181(c)(6))** to reach an en-route alternate (ERA) aerodrome in case of engine or pressurisation failure.

ONE OR MORE AERODROMES

(c) Point **CAT.OP.MPA.182(d)** requires the operator to select one or more aerodromes at the planning stage; the operator may select only one aerodrome, i.e. the destination aerodrome, in compliance with point **CAT.OP.MPA.181(c)(4)(ii)**.

TWO SAFE-LANDING OPTIONS

(d) Point **CAT.OP.MPA.182(d)** requires that when planning the flight, two safe-landing options are expected to remain available until the flight reaches its destination, where a decision will be made to commit to land or divert. This will typically be a runway at the destination aerodrome itself and a runway at a destination alternate aerodrome. The requirement may also be satisfied by two landing runways at the destination aerodrome, provided that the risk of a single event (such as an aircraft accident) or meteorological deterioration at that single aerodrome will not eliminate both options.

(e) **Point CAT.OP.MPA.182(d)** may also be satisfied by two destination alternate aerodromes when the destination aerodrome is not a weather-permissible aerodrome or when there is insufficient weather information at the time of planning.

(f) In the case of an isolated aerodrome, only one safe-landing option exists beyond the point of no return (PNR), therefore, an exception is set out in point **CAT.OP.MPA.182(d)(2),** where the conditions to proceed beyond the PNR are laid down, and further explained in **AMC7 CAT.OP.MPA.182** and in point (b) of **AMC2 CAT.OP.MPA.185(a).**

SAFETY MARGINS

(g) **Point CAT.OP.MPA.182(e)** requires operators to apply safety margins to the aerodrome operating minima to mitigate the risk that the destination alternate aerodromes, isolated aerodromes, or fuel ERA aerodromes fall below aerodrome operating minima due to minor unforeseen weather deteriorations.

GM1 CAT.OP.MPA.182 is replaced by the following:

GM2~~1~~ CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes ~~Destination aerodromes — instrument approach operations~~

BASIC FUEL SCHEME WITH VARIATIONS – NORMAL CRUISE CONSUMPTION ~~INTENT OF AMC1~~

(a) ~~The limitation applies only to destination alternate aerodromes for flights when a destination alternate aerodrome is required. A take-off or en route alternate aerodrome with instrument approach procedures relying on GNSS may be planned without restrictions. A destination aerodrome with all instrument approach procedures relying solely on GNSS may be used without a destination alternate aerodrome if the conditions for a flight without a destination alternate aerodrome are met.~~

(b) ~~The term 'available' means that the procedure can be used in the planning stage and complies with planning minima requirements.~~

In the context of **AMC7 CAT.OP.MPA.182** on isolated aerodromes, normal cruise consumption is the consumption of fuel for 2 hours above the isolated aerodrome. These two hours include 30-minute FRF/energy, leaving enough fuel for an approximately 90-minute hold over the destination.

More information is provided in ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual* (1st Edition, 2015).

The following GM3 CAT.OP.MPA.182 is inserted:

GM3 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS – FACILITIES WITH A SYSTEM MINIMUM OF 200 FT OR LESS

(a) Table 3 in **AMC8 CAT.OP.MPA.182** and Table 4 in **AMC9 CAT.OP.MPA.182** refer to type A instrument approach operations based on a facility with a system minimum of 200 ft or less. Such facilities include ILS/MLS, GBAS landing system (GLS) and GNSS/SBAS (LPV). The system minima for various facilities are contained in **AMC3 CAT.OP.MPA.110**, Table 3.

(b) In regard to system minima and type of instrument approach operation (type A or B), the following should be noted:

(1) system minimum is the lowest height to which a facility can be used without visual references. This value is not related to a particular runway or obstacle environment.

(2) the type of instrument approach operations is related to each individual runway with its obstacle environment.

(c) Amongst other things the lowest DH for an instrument approach operation is determined by the system minima for the facility and the obstacle clearance height (OCH). The resulting DH determines the type of approach operation (type A or B). If the DH is 250 ft or more, it will be a type A approach operation; if the DH is less than 250 ft, it will be a type B approach operation. So, while ILS approaches to most runways may be conducted as type B approach operations, difficult obstacle situations, driving up the DH to 250 ft or higher, will result in type A approach operations.

(d) For example, Row 2 of Table 3 in **AMC8 CAT.OP.MPA.182** refers to a case where the obstacle situation and associated OCH result in a DH of 250 ft or more, even though the facility involved supports a DH of 200 ft or less.

(e) This GM refers only to DH (not MDH) since facilities with a system minimum of 200 ft or less are only operated with a DH (or DA), not an MDH.

The following GM4 CAT.OP.MPA.182 is inserted:

GM4 CAT.OP.MPA.182 Fuel/energy scheme – aerodrome selection policy - aeroplanes

FUEL SCHEMES – PLANNING MINIMA – INSTRUMENT APPROACH OPERATIONS

An instrument approach operation is considered usable for planning minima (e.g. Tables 2, 3 and 4 in **AMC6 CAT.OP.MPA.182**, **AMC8 CAT.OP.MPA.182** and **AMC9 CAT.OP.MPA.182** respectively) when the approach facilities are available, the aircraft is equipped to perform such an approach, the flight crew is accordingly trained, and the runway is available for landing.

The following GM1 CAT.OP.MPA.182(d)(1) is inserted:

GM1 CAT.OP.MPA.182(d)(1) Fuel/energy scheme – aerodrome selection policy - aeroplanes

INDIVIDUAL FUEL SCHEME – REACHING THE DESTINATION AERODROME

In the context of individual fuel schemes, 'reaching the destination' means being as close as possible to the destination, but not necessarily overhead the destination, and no farther than IAF of the planned instrument approach procedure for the destination aerodrome.

The following AMC1 CAT.OP.MPA.182(f) is inserted:

AMC1 CAT.OP.MPA.182(f) Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME – DESTINATION AERODROMES – PBN OPERATIONS

(a) To comply with point **CAT.OP.MPA.182(f),** when the operator intends to use PBN, the operator should select an aerodrome as destination alternate aerodrome only if an instrument approach procedure that does not rely on a GNSS is available either at that aerodrome or at the destination aerodrome.

BASIC FUEL SCHEME — DESTINATION AERODROMES — OPERATIONAL CREDITS

(b) To comply with point **CAT.OP.MPA.182(f),** when the operator intends to use 'operational credits' (e.g. EFVS, SA CAT I, etc.), the operator should select an aerodrome as destination alternate aerodrome only if an approach procedure that does not rely on the same 'operational credit' is available either at that aerodrome or at the destination aerodrome.

The following GM1 CAT.OP.MPA.182(f) is inserted:

GM1 CAT.OP.MPA.182(f) Fuel/energy scheme – aerodrome selection policy - aeroplanes

BASIC FUEL SCHEME – DESTINATION AERODROMES – PBN OPERATIONS

(a) Point (a) of **AMC1 CAT.OP.MPA.182(f)** applies only to destination alternate aerodromes in flights that require a destination alternate aerodrome. A take-off or an ERA aerodrome with instrument approach procedures that rely on a GNSS may be planned without restrictions. A destination aerodrome with all instrument approach procedures that rely solely on a GNSS may be used without a destination alternate aerodrome if the conditions for a flight without a destination alternate aerodrome are met.

(b) The term 'sufficient means are available to navigate to and land at' means that the procedure can be used in the planning stage and should comply with planning minima requirements.

GM1 CAT.OP.MPA.185 is replaced by the following:

GM1 CAT.OP.MPA.185 ~~Planning minima for IFR flights – aeroplanes~~ Fuel/energy scheme – in-flight fuel/energy management policy - aeroplanes

~~**PLANNING MINIMA FOR ALTERNATE AERODROMES**~~

~~Non-precision minima (NPA) in Table 1 of CAT.OP.MPA.185 mean the next highest minima that apply in the prevailing wind and serviceability conditions. Localiser only approaches, if published, are considered to be non-precision in this context. It is recommended that operators wishing to publish tables of planning minima choose values that are likely to be appropriate on the majority of occasions (e.g. regardless of wind direction). Unserviceabilities should, however, be fully taken into account.~~

~~As Table 1 does not include planning minima requirements for APV, lower than standard (LTS) CAT I and other than standard (OTS) CAT II operations, the operator may use the following minima:~~

~~(a) for APV operations — NPA or CAT I minima, depending on the DH/MDH;~~

~~(b) for LTS CAT I operations — CAT I minima; and~~

~~(c) for OTS CAT II operations — CAT II minima.~~

BASIC FUEL SCHEME

RELEVANT FUEL DATA TO BE RECORDED

(a) The operator may decide at which regular intervals the relevant fuel data should be recorded. An example of such intervals could be every 30 minutes for short-range flights and every 60 minutes for longer flights.

(b) The operator should record at least the following relevant fuel-related data:

(1) off-block fuel;

(2) take-off fuel if this data can be recorded automatically;

(3) 'MINIMUM FUEL' declarations;

(4) 'MAYDAY MAYDAY MAYDAY FUEL' declarations;

(5) fuel after touchdown if this data can be recorded automatically; and

(6) on-block fuel.

When an aircraft communications addressing and reporting system (ACARS) is available, the pilot does not need to be the one recording this data.

RELIABLE SOURCE TO OBTAIN DELAY INFORMATION

(c) A reliable source to obtain delay information may be derived from data provided by an air navigation services provider (ANSP) and should have the following characteristics ranked in order of priority:

(1) integrity: provide timely warnings to users when the delay information should not be used;

(2) availability: the time during which the delay information is accessible to the crew;

(3) accuracy: the degree of conformity between the estimated delay and the true delay; the delay information should be communicated with its corresponding gap error, e.g. delay of 15 ± 2 minutes; the gap error should be added to the base value; and

(4) continuity: the capability of the service to provide the delay information without unscheduled interruptions during the intended operation.

'MINIMUM FUEL' DECLARATION

(d) The 'MINIMUM FUEL' declaration informs the ATC that all planned aerodrome options have been reduced to a specific aerodrome of intended landing. It also informs the ATC that any change to the existing clearance may result in landing with less than the planned FRF/energy. This is not an emergency situation but an indication that an emergency situation is possible, should any additional delay occur.

(e) When committed to land at a specific aerodrome, the commander should take into account any operational factor that may cause a delay to landing, and thus determine whether the aircraft will land with less than the planned FRF/energy, even after receiving clearance from ATC. A change that may cause a delay to landing could be other than the ATC, e.g. a change of weather conditions, etc. If any such factor is likely to result in landing with less than the planned FRF/energy, the commander should declare 'MINIMUM FUEL' to ATC.

(f) The pilot should not expect any form of priority handling as a result of a 'MINIMUM FUEL' declaration. However, the ATC should advise the flight crew of any additional expected delays, as well as coordinate with other ATC units when transferring the control of the aeroplane, to ensure that the other ATC units are aware of the flight's fuel state.

(g) **Example 1:** The aircraft is on the final approach to the destination aerodrome with a single runway, with just the destination alternate fuel plus FRF/energy available. The aircraft ahead has a tyre burst upon landing and has stopped on the runway. The ATC orders the aircraft on final approach to execute a go-around as the destination aerodrome is closed due to a blocked runway. After completing the go-around, the flight crew decides to divert to the destination alternate aerodrome. After the ATC gives clearance for the destination alternate aerodrome and if the calculated fuel upon landing is close to the FRF/energy, the flight crew should declare 'MINIMUM FUEL'. The flight crew has now committed to land at the destination alternate aerodrome, and any change to the clearance may result in landing there with less than the planned FRF/energy.

(h) **Example 2:** The aircraft is approaching the clearance limit point, which has a holding pattern operating at this point in time. The ATC gives the aircraft an expected arrival time that would result in a delay of 25 minutes, and the aircraft enters the holding zone. On receiving this information and prior to entering the holding pattern, the remaining fuel is 7-minute contingency fuel plus 25-minute destination alternate fuel plus 30-minute FRF/energy. The weather conditions and aircraft serviceability are such that the flight crew can convert the destination alternate fuel into holding time over the destination aerodrome. When the remaining fuel no longer allows a diversion from the holding pattern, then the flight crew should declare 'MINIMUM FUEL'. The flight crew has committed to land at the destination aerodrome, and any change to the clearance may result in landing with less than the planned FRF/energy.

(i) **Example 3**: The aircraft reaches FL 350, which is the cruising flight level on its 5-hour flight. The weather forecast information that was obtained before departure was favourable and, therefore, the commander did not order any discretionary fuel. The destination alternate fuel is sufficient for 25-minute flight time and the destination alternate aerodrome is located beyond the destination aerodrome. For some reason (unexpected severe turbulence, cockpit window crack, etc.), the aircraft has to descend and continue the flight at FL 230, where fuel consumption is higher. In-flight fuel checks and fuel management now show that the destination aerodrome can still be reached but only if in-flight re-planning is done without the destination alternate aerodrome (the destination aerodrome has two runways and good weather, and it is less than 6-hour flight time away, thus meeting the conditions for not requiring an alternate aerodrome). By doing so, the aircraft will arrive at destination for a straight-in approach with exactly the FRF/energy plus 15-minute flight time. During the next 3,5 hours, an ERA aerodrome is available, and the situation is under control. When approaching the destination, the aircraft has to commit to land at the destination aerodrome as there is no other destination alternate aerodrome within 15 minutes of reaching the destination aerodrome. The ATC now informs the pilots that there is a change of landing runway resulting in a 12-minute trip fuel increase. It is time to declare 'MINIMUM FUEL'.

(j) Several scenarios illustrating circumstances that could lead to a 'MINIMUM FUEL' declaration are provided in ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual* (1st Edition, 2015) and the *EASA Fuel Manual*.

ENSURING A SAFE LANDING — FINAL RESERVE FUEL/ENERGY PROTECTION

(k) The objective of the FRF/energy protection is to ensure that a safe landing is made at any aerodrome when unforeseen circumstances may not allow to safely complete the flight, as originally planned. The commander should always consider first planning a safe-landing option and estimating whether this landing can be performed with more than the FRF/energy. When this estimation indicates that the FRF/energy can no longer be protected, then a fuel emergency should be declared and any landing option explored (e.g. aerodromes not assessed by operators, military aerodromes, closed runways), including deviating from rules, operational procedures, and methods in the interest of safety (as per point **CAT.GEN.MPA.105(b)).** ICAO Doc 9976 and the EASA Fuel Manual provide further detailed guidance on the development of a comprehensive in-flight fuel management policy and related procedures. Note: See Annex I (Definitions) to UK Regulation (EU) No 965/2012 for the definition of 'safe landing'.

FURTHER GUIDANCE ON PROCEDURES FOR IN-FLIGHT FUEL MANAGEMENT

(l) ICAO Doc 9976 and the EASA *Fuel Manual* provide guidance on procedures for in-flight fuel management including reanalysis, adjustment, and/or re-planning considerations when a flight begins to consume contingency fuel before take-off.

The following AMC1 CAT.OP.MPA.185(a) is inserted:

AMC1 CAT.OP.MPA.185(a) Fuel/energy scheme – in-flight fuel/energy management policy - aeroplanes

BASIC FUEL SCHEME – PROCEDURES FOR IN-FLIGHT FUEL MANAGEMENT

(a) In-flight fuel checks

(1) The operator should establish a procedure to ensure that in-flight fuel checks are carried out at regular intervals or at specified points indicated in the operational flight plan (one check at least every 60 minutes).

(2) The remaining usable fuel should be evaluated to:

(i) compare the actual consumption with the planned consumption;

(ii) check that the remaining usable fuel is sufficient to complete the flight, in accordance with point (b); and

(iii) determine the usable fuel that is expected to remain upon landing at the destination aerodrome.

(3) In relation to the recording of relevant data, the operator should:

(i) agree with the CAA on what constitutes relevant data for the purpose of recoding;

(ii) use the relevant data as safety performance indicators (SPIs) of the current fuel scheme; and

(iii) ensure that the recorded data is stored for at least 2 years. The operator should establish a procedure for the data to be de-identified to a level that ensures the implementation of a 'just culture'.

(b) In-flight fuel management

(1) The flight should be conducted to ensure that the usable fuel expected to remain upon landing at the destination aerodrome is not less than:

(i) the required alternate fuel plus the FRF/energy; or

(ii) the FRF/energy if no alternate aerodrome is required.

(2) If an in-flight fuel check shows that the usable fuel expected to remain upon landing at the destination aerodrome is less than:

(i) the required alternate fuel plus the FRF/energy, the commander should request delay information from the ATC, and take into account the prevailing traffic and operational conditions at the destination aerodrome, at the destination alternate aerodrome, and at any other adequate aerodrome, to decide whether to proceed to the destination aerodrome or to divert in order to perform a safe landing with not less than the FRF/energy; or

(ii) the FRF/energy, if no destination alternate aerodrome is required, the commander should take appropriate action and proceed to an aerodrome where a safe landing can be made with not less than the FRF/energy.

(d) The use of fuel after flight commencement for objectives other than the ones originally intended during pre-flight planning should require reanalysis and, if applicable, adjustment of the planned operation.

The following AMC2 CAT.OP.MPA.185(a) is inserted:

AMC2 CAT.OP.MPA.185(a) Fuel/energy scheme – in-flight fuel/energy management policy - aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS – PROCEDURES FOR IN-FLIGHT FUEL MANAGEMENT

(a) In addition to **AMC1 CAT.OP.MPA.185(a)** and in the context of point (d) of **AMC6 CAT.OP.MPA.181**, if the RCF procedure is used on a flight to proceed to destination 1 aerodrome, the commander should ensure that the remaining usable fuel at the decision point is at least the total of the following:

(1) trip fuel from the decision point to destination 1 aerodrome;

(2) contingency fuel that is equal to 5 % of the trip fuel from the decision point to destination 1 aerodrome;

(3) destination 1 aerodrome alternate fuel if a destination 1 alternate aerodrome is required;

(4) additional fuel, if required; and

(5) FRF/energy.

(b) In addition to **AMC1 CAT.OP.MPA.185(a)**, on a flight to an isolated aerodrome, the commander should ensure that the remaining usable fuel at the actual PNR is at least the total of the following:

(1) trip fuel from the PNR to the destination isolated aerodrome;

(2) contingency fuel from the PNR to the destination isolated aerodrome; and

(3) the additional fuel required for isolated aerodromes, as described in **AMC7 CAT.OP.MPA.182**.

The following AMC3 CAT.OP.MPA.185(a) is inserted:

AMC 3CAT.OP.MPA.185(a) Fuel/energy scheme – in-flight fuel/energy management policy - aeroplanes

INDIVIDUAL FUEL SCHEME WITH VARIATIONS – COMMITING TO LAND AT A SPECIFC AERODROME

The operator should provide relevant safety information to the commander before the commander decides to commit to land at a specific aerodrome.

GM2 CAT.OP.MPA.185 is deleted:

~~GM2 CAT.OP.MPA.185 Planning minima for IFR flights — aeroplanes~~

~~**AERODROME WEATHER FORECASTS**~~

~~APPLICATION OF AERODROME FORECASTS (TAF & TREND) TO PRE-FLIGHT PLANNING (ICAO Annex 3 refers)~~

~~**1. APPLICATION OF INITIAL PART OF TAF**~~

~~a) **Application time period:** From the start of the TAF validity period up to the time of applicability of the first subsequent 'F~~
~~is given, up to the end of the validity period of the TAF.~~

~~b) **Application of forecast:** The prevailing weather conditions forecast in the initial part of the TAF should be fully applied~~
~~gusts (and crosswind) which should be applied in accordance with the policy in the column 'BECMG AT and FM' in the ta~~
~~temporarily by a 'TEMPO' or 'PROB**' if applicable according to the table below.~~

~~**2. APPLICATION OF FORECAST FOLLOWING CHANGE INDICATION IN TAF AND TREND**~~

~~TAF or TREND for AERODROME PLANNED AS:~~	~~FM (alone) and BECMG AT:~~	~~BECMG (alone), BECMG FM, BECMG TL, BECMG FM…*TL, in case of:~~		~~TEMPO (alone), TEMPO FM, TEMPO FM…TL~~	
	~~**Deterioration and Improvement**~~	~~**Deterioration**~~	~~**Improvement**~~	~~**Deterioration**~~	
				~~**Transient/Shower Conditions** in connection with short-lived weather phenomena,~~	~~**Persistent Con…** in connection w… haze, mist, …~~

				e.g. thunderstorms, showers	dust/sandsto continuous preci
DESTINATION at ETA ± 1 HR TAKE – OFF ALTERNATE at ETA ± 1 HR DEST. ALTERNATE at ETA ± 1 HR EN-ROUTE ALTERNATE at ETA ± 1 HR	Applicable from the **start of the change** **Mean wind:** Should be within required limits **Gusts:** May be disregarded	Applicable from the time **of the start of** the change **Mean wind:** Should be within required limits **Gusts:** May be disregarded	Applicable from the time **of the end of** the change **Mean wind:** Should be within required limits **Gusts:** May be disregarded	Not applicable **Mean wind and gusts** exceeding required limits may be disregarded	Applicabl **Mean win** Should be wi required lin **Gusts:** May be disreg
ETOPS ENRT ALTN at earliest/latest ETA ± 1 HR	Applicable from the **time of start** of change **Mean wind:** should be within required limits **Gusts** exceeding crosswind limits should be fully applied	Applicable from the **time of start** of change **Mean wind:** should be within required limits **Gusts** exceeding crosswind limits should be fully applied	Applicable from the **time of end** of change **Mean wind:** should be within required limits **Gusts** exceeding crosswind limits should be fully applied	**Applicable if below applicable landing minima** **Mean wind:** Should be within required limits **Gusts** exceeding crosswind limits should be fully applied	**Applicable if b applicable lan minima** **Mean win** Should be wi required lin **Gusts** excee crosswind limits be fully app
Note 1: 'Required limits' are those contained in the Operations Manual. Note 2: If promulgated aerodrome forecasts do not comply with the requirements of ICAO Annex 3, operators should ensure reports is provided. * The space following 'FM' should always include a time group e.g. 'FM1030'.					

GM1 CAT.OP.MPA.186 is deleted:

GM1 CAT.OP.MPA.186 Planning minima for IFR flights — helicopters

PLANNING MINIMA FOR ALTERNATE AERODROMES

Non-precision minima (NPA) in Table 1 of **CAT.OP.MPA.186** mean the next highest minima that apply in the prevailing wind and serviceability conditions. Localiser only approaches, if published, are considered to be non-precision in this context. It is recommended that operators wishing to publish tables of planning minima choose values that are likely to be appropriate on the majority of occasions (e.g. regardless of wind direction). Unserviceabilities should, however, be fully taken into account.

As Table 1 does not include planning minima requirements for APV, LTS CAT I and OTS CAT II operations, the operator may use the following minima:

(a) for APV operations — NPA or CAT I minima, depending on the DH/MDH;

(b) for LTS CAT I operations — CAT I minima; and

(c) for OTS CAT II operations — CAT II minima.

The following AMC1 CAT.OP.MPA.190(a) is deleted:

~~AMC1 CAT.OP.MPA.190 Submission of the ATS flight plan~~

~~**FLIGHTS WITHOUT ATS FLIGHT PLAN**~~

~~(a) When unable to submit or to close the ATS flight plan due to lack of ATS facilities or any other means of communications to ATS, the operator should establish procedures, instructions and a list of nominated persons to be responsible for alerting search and rescue services.~~

~~(b) To ensure that each flight is located at all times, these instructions should:~~

~~(1) provide the nominated person with at least the information required to be included in a VFR flight plan, and the location, date and estimated time for re-establishing communications;~~

~~(2) if an aircraft is overdue or missing, provide for notification to the appropriate ATS or search and rescue facility; and~~

The following AMC1 CAT.OP.MPA.191(b) & (c) is inserted:

AMC1 CAT.OP.MPA.191(b) & (c) Fuel/energy scheme – fuel/energy planning and i-flight re-planning policy - helicopters

PLANNING CRITERIA

(a) The pre-flight calculation of the required usable fuel to be carried on board should include the following:

(1) taxi fuel, which should take into account local conditions at the departure site and the APU consumption;

(2) trip fuel, which should include fuel:

(i) for take-off and climb from the departure site elevation to the initial cruising level/altitude, taking into account the expected departure routing;

(ii) from the top of climb to the top of descent, including any step climb/descent;

(iii) from the top of descent to the point where the approach procedure is initiated, taking into account the expected arrival procedure; and

(iv) for the approach and landing at the destination site;

(3) contingency fuel, which should be:

(i) for IFR flights, or for VFR flights in a hostile environment, 10 % of the planned trip fuel; or

(ii) for VFR flights in a non-hostile environment, 5 % of the planned trip fuel;

(4) alternate fuel, which should be:

(i) fuel for a missed approach from the applicable DA/H or MDA/H at the destination to the missed-approach altitude, taking into account the complete missed-approach procedure;

(ii) fuel for climb from the missed approach altitude to the cruising level/altitude;

(iii) fuel for the cruise from the top of climb to the top of descent;

(iv) fuel for descent from the top of descent to the point where the approach is initiated, taking into account the expected arrival procedure;

(v) fuel for the approach and landing at the destination alternate that is selected In accordance with point **CAT.OP.MPA.192**; and

(vi) for helicopters operating to or from helidecks that are located in a hostile environment, 10 % of points (a)(4)(i) to (a)(4)(v); (5) FRF/energy;

(6) extra fuel if there are anticipated delays or specific operational constraints; and

(7) discretionary fuel, which should be at the sole discretion of the commander.

(b) Reduced contingency fuel (RCF) IFR procedure If the operator's fuel scheme includes pre-flight planning to a destination 1 aerodrome (commercial destination) with an RCF procedure using a decision point along the route and a destination 2 aerodrome (optional refuelling destination), the pre-flight calculation of the required usable fuel should be according to points (b)(1) or (b)(2), whichever is greater:

(1) the sum of:

(i) taxi fuel;

(ii) trip fuel to the destination 1 aerodrome via the decision point;

(iii) contingency fuel equal to not less than 10 % of the estimated fuel consumption from the decision point to the destination 1 aerodrome;

(iv) alternate fuel; (v) FRF/energy;

(vi) extra fuel if there are anticipated delays or specific operational constraints; and

(vii) discretionary fuel, which should be at the sole discretion of the commander; or

(2) the sum of:

(i) taxi fuel;

(ii) trip fuel to the destination 2 aerodrome via the decision point;

(iii) contingency fuel equal to not less than 10 % of the estimated fuel consumption from the decision point to the destination 2 aerodrome;

(iv) alternate fuel, if a destination 2 alternate aerodrome is required;

(v) for FRF/energy, comply with CAT.OP.MPA.191 (c)(5);

(vi) extra fuel if there are anticipated delays or specific operational constraints; and

(vii) discretionary fuel, which should be at the sole discretion of the commander.

(c) Isolated aerodrome IFR procedure If the operator's fuel policy includes planning to fly to an isolated aerodrome under IFR or under VFR over routes not navigated by reference to visual landmarks, for which a destination alternate does not exist, the pre-flight calculation of the required usable fuel should include:

(1) taxi fuel;

(2) trip fuel;

(3) contingency fuel calculated in accordance with point (a)(3);

(4) additional fuel to fly for 2 hours at holding speed, including FRF/energy; and

(5) extra fuel if there are anticipated delays or specific operational constraints; and

(6) discretionary fuel, which should be at the sole discretion of the commander.

(d) Sufficient fuel should be carried at all times to ensure that following the failure of an engine that occurs at the most critical point along the route, the helicopter is able to:

(1) descend as necessary and proceed to an adequate aerodrome;

(2) hold for 15 minutes at 1 500 ft (450 m) above aerodrome elevation in standard conditions; and

(3) make an approach and land.

The following AMC1 CAT.OP.MPA.192 is inserted:

AMC1 CAT.OP.MPA.192 Selection of aerodromes and operating sites - helicopters

PLANNING MINIMA AND SAFETY MARGINS FOR A DESTINATION AERODROME AND SELECTION OF ALTERNATE AERODROMES

(a) When selecting the destination aerodrome, the operator should ensure that one of the following conditions is met:

(1) for a land destination, the duration of the flight and the prevailing meteorological conditions are such that during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the aerodrome or operating site, an approach and landing is possible under VMC from the minimum safe altitude at the IAF or before;

(2) for a land destination:

(i) the available current meteorological information indicates that the following meteorological conditions at the destination aerodrome will exist from 2 hours before to 2 hours after the estimated time of arrival, or from the actual time of departure to 2 hours after the estimated time of arrival, whichever is shorter:

(A) a ceiling of at least 120 m (400 ft) above the DA/H or MDA/H of the instrument approach procedure; and

(B) visibility of at least 3 000 m;

(ii) a runway and two published instrument approaches with independent navigation aids are available at the aerodrome of intended landing; and

(iii) fuel planning is based upon the approach procedure that requires the most fuel, and 15-minute fuel is added to the trip fuel;

(3) one destination alternate aerodrome is selected, and the appropriate weather reports and/or forecasts indicate that during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the destination, the weather conditions at the destination will be at or above the applicable planning minima as follows:

(i) RVR or VIS specified in accordance with point CAT.OP.MPA.110; and

(ii) for type A instrument approach operations, ceiling at or above (M)DH;

(4) one destination alternate aerodrome is selected, and based on the meteorological information that is obtained in accordance with the procedures of the operations manual (OM), there is a reasonable probability of landing at the destination;

(5) two destination alternate aerodromes are selected; or

(6) the destination aerodrome is isolated, and the appropriate weather reports and/or forecasts indicate that during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the destination, the weather conditions at the destination will be at or above the applicable planning minima defined in Table 1.

(b) The operator should specify any alternate aerodrome(s) in the operational flight plan.

(c) If the site of intended landing is isolated and no alternate aerodrome is available, a PNR should be determined.

PLANNING MINIMA FOR DESTINATION ALTERNATE AERODROMES AND ISOLATED AERODROMES

(d) The operator should select the destination alternate aerodrome(s) only if the appropriate weather reports and/or forecasts indicate that during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the aerodrome or operating site, the weather conditions will be at or above the applicable planning minima as follows:

(1) if the destination aerodrome is selected by meeting the conditions in points (a)(3) or (a)(5), the planning minima for the destination alternate aerodrome(s) and an isolated aerodrome are as shown in Table 1:

Table 1 — Planning minima for a destination alternate aerodrome and an isolated aerodrome

Type of approach	**Planning minima**
Type A or type B	RVR/VIS + 400 m Ceiling at or above (M)DH + 200 ft

VFR or visual approach	VFR from a position on the instrument flight path to the destination alternate aerodrome

Or

(2) if the destination aerodrome is selected by meeting the condition in point (a)(4), the planning minima for the destination alternate aerodrome(s) are as shown in Table 2:

Table 2 — Planning minima for a destination alternate aerodrome with a reasonable probability of landing at the destination

Type of approach	**Planning minima**
Type A or type B	RVR/VIS + 800 m (M)DH + 400 ft
VFR or visual approach	VFR from a position on the instrument flight path to the destination alternate aerodrome

DETERMINATION OF THE METEOROLOGICAL CONDITIONS FOR A SAFE LANDING AT THE DESTINATION

(e) To assess the probability of landing at the destination, when flying under IFR to heliports/operating sites without the meteorological information from a certified service provider, the operator should use supplemental meteorological information, or the operator should select two destination alternates. Such meteorological information is usually available at aerodromes. In Europe, the certification of service providers is based on Annex V (Part-MET) to **UK Regulation (EU) 2017/373**. In addition, all the following conditions should be met:

(1) The operator should establish a system for observing and assessing the weather, as well as for distributing meteorological information.

(2) The operator should describe in the OM the system defined in point (1).

(3) The operator should assess the weather at the destination aerodrome, and if different, also at the location of the instrument approach. The assessment should be based on the following:

(i) an appropriate weather forecast at an aerodrome where it is reasonable to expect that the local conditions are not significantly different from the conditions at the destination and the location of the instrument approach;

(ii) if the aerodrome described in point (e)(3)(i) is farther than 15 NM away from the location of the approach and the destination, the following conditions should be met:

(A) supplemental meteorological information should be available and confirm that the current weather conditions at destination and at the location of the instrument approach are expected to remain similar to the conditions at the aerodrome described in point (e)(3)(i); and

(B) low-level area forecasts should confirm that the weather is expected to remain similar at destination and at the aerodrome used for the weather assessment, at the expected time of landing; and

(iii) any risk of adverse local weather condition forecast in the low-level area forecasts and relevant to the destination and the location of the instrument approach.

(4) The following should qualify as supplemental meteorological information:

(i) a reliable, timestamped image from a serviceable digital camera of known location, bearing, and altitude, which shows the weather conditions in the approach path at destination;

(ii) a meteorological observation from a properly trained observer; and

(iii) a report from non-certified automatic weather observation systems to which the operator should apply relevant margins based on the reliability and precision of the system.

(5) The operator should establish that there is a reasonable probability of landing at the destination only if the flight time to the destination and then to the alternate aerodrome is less than 3 hours, and if according to the assessment described in point (e)(3), during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the location of the approach, the following conditions are met:

(i) the weather conditions will be at or above the planning minima for the approach; and

(ii) if the location of the approach is different from that of the destination aerodrome, the weather conditions will allow to continue the flight to the destination.

(6) Weather observations from the aerodrome described in point (e)(3)(i), or the supplemental meteorological information that is described in point (e)(4), should be available, be no more than 30 minutes old, and be used to assess approach and landing conditions in accordance with point **CAT.OP.MPA.300**.

(7) The weather observations or information that are described in point (e)(6) may be transmitted to the flight crew using installed equipment, a T-PED, radio communication with trained personnel, or any equivalent means

(8) The operator should store the weather assessments established in point (e)(3) and the weather observations referred to in point (e)(6) for a period of 3 months.

(9) In case a landing at the destination is not possible due to the weather, even though it was assessed that it would be, the operator should investigate and take all necessary measures to improve future weather assessments

The following AMC1 CAT.OP.MPA.192(a) is inserted:

AMC1 CAT.OP.MPA.192(a) Selection of aerodromes and operating sites - helicopters

PLANNING MINIMA FOR TAKE-OFF ALTERNATE AERODROMES

The operator should select an aerodrome or landing site as a take-off alternate aerodrome or landing site only when the appropriate weather reports and/or forecasts indicate that during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the take-off alternate aerodrome or landing site, the weather conditions will be at or above the applicable landing minima specified in accordance with point **CAT.OP.MPA.110.** The ceiling should be taken into account when the only available approach operations are type A. Any limitations related to OEI operations should be also taken into account.

The following GM1 CAT.OP.MPA.192(c) & (d) is inserted:

GM1 CAT.OP.MPA.192(c) & (d) Selection of aerodromes and operating sites - helicopters

METEOROLOGICAL INFORMATION

(a) Meteorological data conforms to ICAO Annex 3 and to Annex V (Part-MET) to **UK Regulation (EU) 2017/373**. As the following meteorological data is point specific, caution should be exercised when associating it with nearby aerodromes (or helidecks).

(b) METARs

(1) Routine and special meteorological observations at offshore installations should be made during periods and at a frequency agreed between the CAA of the meteorological services provider and the operator concerned. They should conform to points **MET.TR.200** and **MET.TR.205** of Part-MET, including the desirable accuracy of observations, which is specified in **GM2 MET.TR.210**.

(2) Routine and selected special reports are exchanged between meteorological offices in the METAR (aerodrome routine meteorological report) or SPECI (aerodrome special meteorological report) code forms that are prescribed by the World Meteorological Organization.

(c) Aerodrome forecasts (TAFs)

(1) The aerodrome forecast consists of a concise statement of the expected meteorological conditions at an aerodrome and any significant changes expected to occur during a specified period of validity, which is usually not less than 9 hours, and not more than 30 hours. The forecast includes surface wind, visibility, weather and cloud, and expected changes of one or more of these elements during the period. Additional elements may be included as agreed between the meteorological authority and the operators concerned. Where these forecasts relate to offshore installations,

barometric pressure and temperature should be included to facilitate the planning of helicopter landing and take-off performance.

(2) Aerodrome forecasts are most commonly exchanged in the TAF code form, and the detailed description of an aerodrome forecast is promulgated in point **MET.TR.220** of Part-MET, together with the operationally desirable accuracy elements that are specified in **GM3 MET.TR.220**.

(d) Landing forecasts (TRENDS)

(1) The landing forecast consists of a concise statement that indicates any significant changes expected to occur at an aerodrome during the 2-hour period immediately following the time of the observation to which it is appended. It contains one or more of the following meteorological elements: surface wind, visibility, weather phenomena, clouds, and other significant information, such as barometric pressure and temperature, as may be agreed between the meteorological authority and the operators concerned.

(2) The detailed description of the landing forecast is promulgated in point **MET.TR.225** of Part-MET, together with the operationally desirable accuracy of the forecast elements. In particular, the value of the observed cloud height and visibility elements should remain within ± 30 % of the forecast values in 90 % of the cases.

(3) Landing forecasts most commonly take the form of a TREND forecast appended to a local routine report, local special report, METAR, or SPECI.

The following GM2 CAT.OP.MPA.192(c) & (d) is inserted:

GM2 CAT.OP.MPA.192(c) & (d) Selection of aerodromes and operating sites - helicopters

SUPPLEMENTAL METEOROLOGICAL INFORMATION USING DIGITAL IMAGERY

(a) One or more digital images from a digital camera may be considered as supplemental meteorological information if the following criteria are met:

(1) the camera has a known altitude, azimuth, elevation, and field of view; if pan, tilt or zoom functions are available, the image includes the elevation, azimuth, and an indication of how much the image is zoomed;

(2) the camera is robustly fixed to a solid surface and protected from deliberate or accidental interference; it is secured from the effects of wind and precipitation;

(3) the digital image contains date and timestamp information or other means to ensure that the image is up to date; and

(4) the digital image has a clearly specified update frequency.

(b) If the operator uses the digital image to assess ceiling and visibility, the operator should document the height, bearing, and distance of clearly distinguishable features, and provide a reference image taken on a clear day with negligible cloud or mist.

(c) The operator may achieve the purpose of point (b) with a selectable reference image or a selectable data layer to be superposed on the image. Any selectable reference image should clearly indicate that it is a reference image, and not a current image.

(d) If the operator uses night-time digital images, the quality of those images should remain sufficient to be compared to the reference image, and the darkness should not obscure the distinguishable features described in point (b). This may be achieved by adapting the camera to the current luminosity.

(e) If the digital image is stamped with the value of one or more weather parameters, there should be a means to ensure that each parameter is up to date and provided by a reliable and functional sensor; otherwise, that parameter should not be displayed.

(f) If the camera is exposed to local meteorological conditions such as the foehn effect, the operator should document these local conditions, or the supplemental meteorological information should only be valid in the immediate vicinity of the camera.

The following AMC1 CAT.OP.MPA.192(d) is inserted:

AMC1 CAT.OP.MPA.192(d) Selection of aerodromes and operating sites - helicopters

PBN OPERATIONS

(a) To comply with CAT.OP.MPA.192(d), when the operator intends to use PBN, the operator should either:

(1) demonstrate that the GNSS is robust against loss of capability; or

(2) select an aerodrome as a destination alternate aerodrome only if an instrument approach procedure that does not rely on a GNSS is available either at that aerodrome or at the destination aerodrome.

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — HELICOPTERS

(b) The operator may demonstrate robustness against the loss of capability of the GNSS if all of the following criteria are met:

(1) At the flight planning stage, SBAS or GBAS are expected to be available and used.

(2) The failure of a single receiver or system should not compromise the navigation capability required for the intended instrument approach.

(3) The temporary jamming of all GNSS frequencies should not compromise the navigation capability required for the intended route. The operator should establish a procedure to deal with such cases unless other sensors are available to continue on the intended route.

(4) The duration of a jamming event should be determined as follows:

(i) Considering the average speed and height of a helicopter flight, the duration of a jamming event may be considered to be less than 2 minutes.

(ii) The time needed for the GNSS system to re-start and provide the aircraft position and navigation guidance should also be considered.

(iii) Based on (i) and (ii) above, the operator should establish the duration of the loss of GNSS navigation data due to jamming. This duration should be no less than 3 minutes, and may be no longer than 4 minutes.

(5) The operator should ensure resilience to jamming for the duration determined in (4) above, as follows:

(i) If the altitude of obstacles on both sides of the flight path is higher than the planned altitude for a given segment of the flight, the operator should ensure no excessive drift on either side by relying on navigation sensors such as a inertial system with performance in accordance with the intended function.

(ii) If (i) does not apply and the operator cannot rely on sensors other than GNSS, the operator should develop a procedure to ensure that a drift from the intended route during the jamming event has no adverse consequences on the safety of the flight. This procedure may involve air traffic services.

(6) The operator should ensure that no space weather event is predicted to disrupt the GNSS reliability and integrity at both the destination and the alternate aerodrome.

(7) The operator should verify the availability of RAIM for all phases of flight based on GNSS, including navigation to the alternate aerodrome.

(8) The operator's MEL should reflect the elements in points (b)(1) and (b)(2).

OPERATIONAL CREDITS

(c) To comply with point CAT.OP.MPA.192(d), when the operator intends to use 'operational credits' (e.g. EFVS, SA CAT I, etc.), the operator should select an aerodrome as destination alternate aerodrome only if an approach procedure that does not rely on the same 'operational credit' is available either at that aerodrome or at the destination aerodrome.

The following GM1 CAT.OP.MPA.192(d) is inserted:

GM1 CAT.OP.MPA.192(d) Selection of aerodromes and operating sites - helicopters

DESTINATION AND DESTINATION ALTERNATE AERODROMES – PBN OPERATIONS

(a) **AMC1 CAT.OP.MPA.192(d)** applies only to destination alternate aerodromes in flights that require a destination alternate aerodrome. A take-off or ERA aerodrome with instrument approach procedures that rely on a GNSS may be planned without restrictions. A destination aerodrome with all instrument approach procedures that rely solely on a GNSS may be used without a destination alternate aerodrome if the conditions for a flight without a destination alternate aerodrome are met.

(b) The term 'available' means that the procedure can be used in the planning stage and should comply with planning minima requirements.

The following GM2 CAT.OP.MPA.192(d) is inserted:

GM2 CAT.OP.MPA.192(d) Selection of aerodromes and operating sites - helicopters

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — HELICOPTERS

(a) Redundancy of on-board systems ensures that no single on-board equipment failure (e.g. antenna, GNSS receiver, FMS, or navigation display failure) results in the loss of the GNSS capability.

(b) Any shadowing of the GNSS signal or jamming of all GNSS frequencies from the ground is expected to be of a very short duration and affect a very small area. Additional sensors or functions, such as inertial coasting, may be used during jamming events. Jamming should be considered on all segments of the intended route, including the approach.

(c) The availability of GNSS signals can be compromised if space weather events cause 'loss of lock' conditions and more than one satellite signal may be lost on a given GNSS frequency. Until space weather forecasts are available, the operator may use 'nowcasts' as short-term predictions for helicopter flights of short durations.

(d) SBAS also contributes to the mitigation of space weather effects, by both providing integrity messages and correcting ionosphere-induced errors.

(e) Even though SBAS should be available and used, RAIM should remain available autonomously. In case of loss of SBAS, the route and the approach to the destination or alternate aerodrome should still be flown with an available RAIM function.

(f) When available, GNSS based on more than one constellation and more than one frequency may provide better integrity and redundancy regarding failures in the space segment of GNSS, jamming, and resilience to space weather events.

AMC1 CAT.OP.MPA.195 is replaced by the following:

~~AMC1 CAT.OP.MPA.195 Refuelling/defuelling with passengers embarking, on board or disembarking~~

~~**OPERATIONAL PROCEDURES — GENERAL**~~

~~(a) When refuelling/defuelling with passengers on board, ground servicing activities and work inside the aircraft, such as catering and cleaning, should be conducted in such a manner that they do not create a hazard and allow emergency evacuation to take place through those aisles and exits intended for emergency evacuation.~~

~~(b) The deployment of integral aircraft stairs or the opening of emergency exits as a prerequisite to refuelling is not necessarily required.~~

~~**OPERATIONAL PROCEDURES — AEROPLANES**~~

~~(c) Operational procedures should specify that at least the following precautions are taken:~~

~~(1) one qualified person should remain at a specified location during fuelling operations with passengers on board. This qualified person should be capable of handling emergency procedures concerning fire protection and firefighting, handling communications, and initiating and directing an evacuation;~~

~~(2) two-way communication should be established and should remain available by the aeroplane's inter-communication system or other suitable means between the ground crew supervising the refuelling and the qualified personnel on board the aeroplane; the involved personnel should remain within easy reach of the system of communication;~~

~~(3) crew, personnel and passengers should be warned that re/defuelling will take place;~~

~~(4) 'Fasten Seat Belts' signs should be off;~~

~~(5) 'NO SMOKING' signs should be on, together with interior lighting to enable emergency exits to be identified;~~

~~(6) passengers should be instructed to unfasten their seat belts and refrain from smoking;~~

~~(7) the minimum required number of cabin crew should be on board and be prepared for an immediate emergency evacuation;~~

~~(8) if the presence of fuel vapour is detected inside the aeroplane, or any other hazard arises during re/defuelling, fuelling should be stopped immediately;~~

~~(9) the ground area beneath the exits intended for emergency evacuation and slide deployment areas should be kept clear at doors where stairs are not in position for use in the event of evacuation; and~~

~~(10) provision is made for a safe and rapid evacuation.~~

~~**OPERATIONAL PROCEDURES — HELICOPTERS**~~

~~(d) Operational procedures should specify that at least the following precautions are taken:~~

~~(1) door(s) on the refuelling side of the helicopter remain closed;~~

~~(2) door(s) on the non-refuelling side of the helicopter remain open, weather permitting;~~

~~(3) firefighting facilities of the appropriate scale be positioned so as to be immediately available in the event of a fire;~~

~~(4) sufficient personnel be immediately available to move passengers clear of the helicopter in the event of a fire;~~

~~(5) sufficient qualified personnel be on board and be prepared for an immediate emergency evacuation;~~

~~(6) if the presence of fuel vapour is detected inside the helicopter, or any other hazard arises during refuelling/defuelling, fuelling be stopped immediately;~~

~~(7) the ground area beneath the exits intended for emergency evacuation be kept clear; and~~

~~(8) provision is made for a safe and rapid evacuation.~~

AMC1 CAT.OP.MPA.195 Fuel/energy scheme – in-flight fuel/energy management policy - helicopters

ENSURING A SAFE LANDING FOR COMPLEX MOTOR-POWERED HELICOPTERS IN OTHER THAN LOCAL OPERATIONS

The operator should base in-flight fuel management procedures on the following criteria:

(a) in-flight fuel checks:

(1) the commander should establish a procedure to ensure that in-flight fuel checks are carried out at regular intervals; the remaining usable fuel should be recorded and evaluated to:

(i) compare the actual consumption with the planned consumption;

(ii) check that the remaining usable fuel is sufficient to complete the flight; and

(iii) determine the usable fuel that is expected to remain upon landing at the destination; and

(2) the relevant fuel data should be recorded;

(b) in-flight fuel management:

(1) if an in-flight fuel check shows that the usable fuel that is expected to remain upon landing at the destination is less than the required alternate fuel plus the FRF/energy, the commander should:

(i) divert; or

(ii) replan the flight in accordance with point **SPA.HOFO.120(b)(1)** unless the commander considers it safer to proceed to the destination; and

(2) at an onshore destination, when two suitable, separate touchdown and lift-off areas are available at the destination, and the expected weather conditions at the destination are as specified for planning in point **CAT.OP.MPA.245(a)(2),** the commander may permit alternate fuel to be used before landing at the destination; and

(c) if an in-flight fuel check on a flight to an isolated destination shows that the usable fuel expected to remain at the point of the last possible diversion is less than the sum of the following:

(1) trip fuel from the point of the last possible diversion to the destination isolated aerodrome;

(2) contingency fuel; and

(3) FRF/energy, or the additional fuel required for isolated aerodromes, the commander should either divert or proceed to the destination, provided that at onshore destinations, two suitable, separate touchdown and lift-off areas are available at the destination, and the expected weather conditions at the destination are as specified for planning in point **CAT.OP.MPA.245(a).**

The following GM1 CAT.OP.MPA.195 is inserted:

GM1 CAT.OP.MPA.195 Fuel/energy scheme – in-flight fuel/energy management policy - helicopters

'MINIMUM FUEL' DECLARATION

(a) The 'MINIMUM FUEL' declaration informs the ATC that all planned landing-site options have been reduced to a specific aerodrome or operating site of intended landing. It also informs the ATC that no other operating site is available, and that any change to the existing clearance, or air traffic delays, may result in landing with less than the planned FRF/energy. This is not an emergency situation but an indication that an emergency situation is possible, should any additional delay occur.

SAFE LANDING — final reserve fuel PROTECTION

(b) The protection of the FRF/energy is intended to ensure that a safe landing is made at any aerodrome or operating site when unforeseen circumstances may not allow to safely complete the operation, as originally planned.

(c) When the FRF/energy can no longer be protected, then a fuel emergency needs to be declared, as per point **CAT.OP.MPA.195(d),** and any landing option explored, including deviating from rules, operational procedures, and methods in the interest of safety (as per point **CAT.GEN.MPA.105(b)).**

(d) The 'MAYDAY MAYDAY MAYDAY FUEL' declaration informs the ATC that all available landing options have been reduced to a specific landing site, and that an FRF/energy portion may be consumed prior to landing.

The following AMC1 CAT.OP.MPA.200 is inserted:

AMC1 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft

REFUELLING WITH AN ENGINE RUNNING – AEROPLANES

(a) Refuelling with an engine running should only be conducted:

(1) when there are no other sources of electrical or pneumatic power to start the engine if shut down;

(2) in accordance with the specific procedures established by the type certificate (TC) holder of the aeroplane;

(3) with aeroplanes that use JET A, JET A-1 or TS-1 fuel types or any other fuel type that has a flash point above 38 °C and is approved by the CAA;

(4) with no passengers embarking, on board, or disembarking;

(5) with permission from the aerodrome operator; and

(6) in the presence of the aerodrome rescue and firefighting services (RFFSs).

(b) The operator should assess the risks associated with refuelling with an engine running and establish appropriate procedures to be followed by all involved personnel, such as flight crew, cabin crew, and ground operations personnel. These procedures should be specified in the OM.

The following AMC2 CAT.OP.MPA.200 is inserted:

AMC2 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft

OPERATIONAL PROCEDURES FOR REFUELLING WITH AN ENGINE RUNNING – AEROPLANES

(a) To reduce the likelihood of conducting refuelling with an engine running, the operator should include in the MEL an operational procedure for dispatch criteria in case of an unserviceable APU, if applicable, to prevent a flight from being dispatched to an aerodrome where no suitable ground support equipment is available.

(b) Appropriate training should be provided to flight crew and maintenance/ground operations personnel that are involved in refuelling with one engine running, as well as to cabin crew, if present on board.

The following AMC3 CAT.OP.MPA.200 is inserted:

AMC3 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft

REFUELLING WITH THE ENGINE(S) RUNNING AND/OR ROTORS TURNING – HELICOPTERS

(a) Refuelling with the engine(s) running and/or rotors turning should only be conducted:

(1) with no passengers or technical-crew members embarking or disembarking;

(2) if the operator of the aerodrome/operating site allows such operations;

(3) in accordance with any specific procedures and limitations in the AFM;

(4) using JET A or JET A-1 fuel types; and

(5) in the presence of the appropriate rescue and firefighting (RFF) facilities or equipment.

(b) In addition, operational procedures in the OM should specify that at least the following precautions are taken:

(1) all necessary information should be exchanged in advance with the aerodrome operator, operating-site operator, and refuelling operator;

(2) the procedures to be used by crew members should be defined;

(3) the procedures to be used by the operator's ground operations personnel that may be in charge of refuelling or assisting in emergency evacuations should be described;

(4) the operator's training programmes for crew members and for the operator's ground operations personnel should be described;

(5) the minimum distance between the helicopter turning parts and the refuelling vehicle or installations should be defined when the refuelling takes place outside an aerodrome or at an aerodrome where there are no such limitations;

(6) besides any RFFSs that are required to be available by aerodrome regulations, an additional handheld fire extinguisher with the equivalent of 5 kg of dry powder should be immediately available and ready for use;

(7) a means for a two-way communication between the crew and the person in charge of refuelling should be defined and established;

(8) if fuel vapour is detected inside the helicopter, or any other hazard arises, refuelling/defuelling should be stopped immediately;

(9) one pilot should stay at the controls, constantly monitor the refuelling, and be ready to shut off the engines and evacuate at all times; and

(10) any additional precautions should be taken, as determined by the risk assessment.

The following AMC4 CAT.OP.MPA.200 is inserted:

AMC4 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft

OPERATIONAL PROCEDURES – PASSENGERS ON BOARD FOR REFUELLING WITH THE ENGINE(S) RUNNING AND/OR ROTORS TURNING – HELICOPTERS

In addition to **AMC3 CAT.OP.MPA.200**, for refuelling with passengers on board, operational procedures in the OM should specify that at least the following precautions are taken:

(a) the positioning of the helicopter and the corresponding helicopter evacuation strategy should be defined taking into account the wind as well as the refuelling facilities or vehicles;

(b) on a heliport, the ground area beneath the exits that are intended for emergency evacuation should be kept clear;

(c) an additional passenger briefing as well as instructions should be defined, and the ‘No smoking’ signs should be on unless ‘No smoking’ placards are installed;

(d) interior lighting should be set to enable identification of emergency exits;

(e) the use of doors during refuelling should be defined: doors on the refuelling side should remain closed, while doors on the opposite side should remain unlocked or, weather permitting, open, unless otherwise specified in the AFM;

(f) at least one suitable person capable of implementing emergency procedures for firefighting, communications, as well as for initiating and directing an evacuation, should remain at a specified location; this person should not be the qualified pilot at the controls or the person performing the refuelling; and

(g) unless passengers are regularly trained in emergency evacuation procedures, an additional crew member or ground crew member should be assigned to assist in the rapid evacuation of the passengers.

The following AMC5 CAT.OP.MPA.200 is inserted:

AMC5 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft

REFUELLING OR DEFUELLING WITH PASSENGERS EMBARKING, ON BOARD OR DISEMBARKING

(a) When passengers are embarking, on board, or disembarking, an aircraft should not be refuelled/defueled with avgas (aviation gasoline) or wide-cut type fuel or a mixture of these types of fuel.

(b) For all other types of fuel, the necessary precautions should be taken, and the aircraft should be properly manned by qualified personnel that should be ready to initiate and direct an evacuation of the aircraft by the most practical and expeditious means available.

The following AMC6 CAT.OP.MPA.200 is inserted:

AMC6 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft

OPERATIONAL PROCEDURES WITH PASSENGERS EMBARKING, ON BOARD OR DISEMBARKING – AEROPLANES

(a) When refuelling/defuelling with passengers on board, ground servicing activities and work inside the aeroplane, such as catering and cleaning, should be conducted in such a manner that they do not create a hazard and allow emergency evacuation through those aisles and exits that are intended for emergency evacuation.

(b) The deployment of integral aeroplane stairs or the opening of emergency exits are not necessarily a prerequisite to refuelling.

(c) Operational procedures should specify that at least the following precautions are taken:

(1) one qualified person should remain at a specified location during refuelling/defuelling operations with passengers on board, and be capable of using emergency procedures for fire protection and firefighting, communications, as well as for initiating and directing an evacuation;

(2) two-way communication should be established and remain available through the aeroplane's intercommunications system, or other suitable means, between the ground crew that supervises the refuelling and the qualified personnel on board the aeroplane; all involved personnel should remain within easy reach of the intercommunications system;

(3) crew, personnel, and passengers should be warned that refuelling/defuelling will take place;

(4) the 'FASTEN SEAT BELT' signs should be off;

(5) 'NO SMOKING' signs should be on, together with interior lighting to allow the identification of emergency exits;

(6) passengers should be instructed to unfasten their seat belts and refrain from smoking;

(7) the minimum required number of cabin crew should be on board and prepared for an immediate emergency evacuation;

(8) if fuel vapour is detected inside the aeroplane, or any other hazard arises, refuelling/defuelling should be stopped immediately;

(9) the ground area beneath the exits that are intended for emergency evacuation, as well as slide deployment areas, should be kept clear where stairs are not in position for use in the event of evacuation; and

(10) provision is made for a safe and rapid evacuation.

The following AMC7 CAT.OP.MPA.200 is inserted:

AMC7 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft

OPERATIONAL PROCEDURES FOR REFUELLING WITH PASSENGERS EMBARKING OR DISEMBARKING – HELICOPTERS WITH THE ENGINE(S) AND ROTORS STOPPED

When the helicopter engine(s) and rotors are stopped, the efficiency and speed of passengers disembarking from and re-embarking on board helicopters should be such that disembarking before refuelling and re-embarking after refuelling is the general practice, except for HEMS or air ambulance operations. However, if such operations are needed, the operator should refer to **AMC3 CAT.OP.MPA.200** and **AMC4 CAT.OP.MPA.200**. Operational procedures to be described in the OM should specify that at least the relevant precautions referred to in the aforementioned AMC are taken.

The following AMC8 CAT.OP.MPA.200 is inserted:

AMC8 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft

REFUELLING OR DEFUELLING WITH WIDE-CUT FUEL

Refuelling/defuelling with wide-cut fuel should be conducted only if the operator has established appropriate procedures, taking into account the high risk of using wide-cut fuel types.

The following GM1 CAT.OP.MPA.200 is inserted:

GM1 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft

OPERATIONAL PROCEDURES FOR REFUELLING WITH AN ENGINE RUNNING – AEROPLANES

For the purpose of refuelling with an engine running, the operator's procedures need to be aligned with the specific procedures laid down in the AFM. In case there are no specific procedures for refuelling with an engine running available in the AFM, the operator and the manufacturer may wish to cooperate to establish such procedures.

The following GM2 CAT.OP.MPA.200 is inserted:

GM2 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft

RISK ASSESSMENT FOR REFUELLING WITH THE ENGINE(S) RUNNING AND/OR ROTORS TURNING – HELICOPTERS

The risk assessment should explain why it is not practical to refuel with the engine(s) and rotors stopped, identify any additional hazards, and describe how the additional risks are controlled. Helicopter emergency medical services (HEMS) and helicopter offshore operations (HOFO) are typical operations where the benefits should outweigh the risks if mitigation measures are taken.

Guidance on safe refuelling practices is contained in ICAO Doc 9137 Airport Services Manual, Parts 1 and 8.

The operators' risk assessment may include, but not be limited to, the following risks, hazards and mitigation measures:

(a) risk related to refuelling with rotors turning;

(b) risk related to the shutting down of the engines, including the risk of failures during start-up;

(c) environmental conditions, such as wind limitations, displacement of exhaust gases, and blade sailing;

(d) risk related to human factors and fatigue management, especially for single-pilot operations for long periods of time;

(e) risk mitigation, such as the safety features of the fuel installation, RFF capability, number of personnel members available, ease of emergency evacuation of the helicopter, etc.;

(f) assessment of the use of radio transmitting equipment;

(g) determination of the use of passenger seat belts;

(h) review of the portable electronic device (PED) policy; and

(i) if passengers are to disembark, consideration of their disembarking before rather than after the refuelling; and

(j) if passengers are to embark, consideration of their embarking after rather than before the refuelling.

The following GM1 CAT.OP.MPA.200 is replaced by the following:

GM31 CAT.OP.MPA.200 Special refuelling or defuelling the aircraft Refuelling/defuelling with wide-cut fuel

PROCEDURES FOR REFUELLING/DEFUELLING WITH WIDE-CUT FUEL

(a) 'Wide-cut fuel' (designated JET B, JP-4 or AVTAG) is an aviation turbine fuel that falls between gasoline and kerosene in the distillation range and consequently, compared to kerosene (JET A or JET A1), it has the properties of higher volatility (vapour pressure), lower flash point and lower freezing point.

(b) Wherever possible, the operator should avoid the use of wide-cut fuel types. If a situation arises such that only wide-cut fuels are available for refuelling/defuelling, operators should be aware that mixtures of wide-cut fuels and kerosene turbine fuels can result in the air/fuel mixture in the tank being in the combustible range at ambient temperatures. The extra precautions set out below are advisable to avoid arcing in the tank due to electrostatic discharge. The risk of this type of arcing can be minimised by the use of a static dissipation additive in the fuel. When this additive is present in the proportions stated in the fuel specification, the normal fuelling precautions set out below are considered adequate.

(c) Wide-cut fuel is considered to be 'involved' when it is being supplied or when it is already present in aircraft fuel tanks.

(d) When wide-cut fuel has been used, this should be recorded in the technical log. The next two uplifts of fuel should be treated as though they too involved the use of wide-cut fuel.

(e) When refuelling/defuelling with turbine fuels not containing a static dissipator, and where wide-cut fuels are involved, a substantial reduction on fuelling flow rate is advisable. Reduced flow rate, as recommended by fuel suppliers and/or aeroplane manufacturers, has the following benefits:

(1) it allows more time for any static charge build-up in the fuelling equipment to dissipate before the fuel enters the tank;

(2) it reduces any charge which may build up due to splashing; and

(3) until the fuel inlet point is immersed, it reduces misting in the tank and consequently the extension of the flammable range of the fuel.

(f) The flow rate reduction necessary is dependent upon the fuelling equipment in use and the type of filtration employed on the aeroplane fuelling distribution system. It is difficult, therefore, to quote precise flow rates. Reduction in flow rate is advisable whether pressure fuelling or over-wing fuelling is employed.

(g) With over-wing fuelling, splashing should be avoided by making sure that the delivery nozzle extends as far as practicable into the tank. Caution should be exercised to avoid damaging bag tanks with the nozzle.

The following AMC1 CAT.OP.MPA.265(a) is inserted:

AMC1 CAT.OP.MPA.265(a) Take-off conditions

METEOROLOGICAL CONDITIONS FOR TAKE-OFF — RUNWAYS

(a) The commander should not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than the applicable minima for landing at that aerodrome unless a weather-permissible take-off alternate aerodrome is available.

(b) If the reported VIS is below the minimum specified for take-off and RVR is not reported, then take-off should only be commenced if the commander can determine that the visibility along the take-off runway is equal to or better than the required minimum.

The following AMC1 CAT.OP.MPA.281 is deleted:

~~AMC1 CAT.OP.MPA.281 In-flight fuel management – helicopters~~

~~**COMPLEX MOTOR-POWERED HELICOPTERS, OTHER THAN LOCAL OPERATIONS**~~

~~The operator should base in-flight fuel management procedures on the following criteria:~~

~~(a) In-flight fuel checks~~

~~(1) The commander should ensure that fuel checks are carried out in-flight at regular intervals. The remaining fuel should be recorded and evaluated to:~~

~~(i) compare actual consumption with planned consumption;~~

~~(ii) check that the remaining fuel is sufficient to complete the flight; and~~

~~(iii) determine the expected fuel remaining on arrival at the destination.~~

~~(2) The relevant fuel data should be recorded.~~

~~(b) In-flight fuel management~~

~~(1) If, as a result of an in-flight fuel check, the expected fuel remaining on arrival at the destination is less than the required alternate fuel plus final reserve fuel, the commander should:~~

~~(i) divert; or~~

~~(ii) replan the flight in accordance with **SPA.HOFO.120** unless he/she considers it safer to continue to the destination.~~

~~(2)At an onshore destination, when two suitable, separate touchdown and lift-off areas are available and the weather conditions at the destination comply with those specified for planning in **CAT.OP.MPA.245(a)(2),** the commander may permit alternate fuel to be used before landing at the destination.~~

~~(c) If, as a result of an in-flight fuel check on a flight to an isolated destination, planned in accordance with (b), the expected fuel remaining at the point of last possible diversion is less than the sum of:~~

~~(1) fuel to divert to an operating site selected in accordance with **CAT.OP.MPA.181(a);**~~

~~(2) contingency fuel; and~~

~~(3) final reserve fuel,~~

~~the commander should:~~

~~(i) divert; or~~

~~(ii) proceed to the destination provided that at onshore destinations, two suitable, separate touchdown and lift-off areas are available at the destination and the expected weather conditions at the destination comply with those specified for planning in **CAT.OP.MPA.245(a)(2).**~~

The following GM1 CAT.OP.MPA.305 is inserted:

GM1 CAT.OP.MPA.305 Commencement and continuation of approach

APPLICATION OF RVR OR VIS REPORTS — AEROPLANES

(a) There is no prohibition on the commencement of an approach based on the reported RVR or VIS. The restriction in CAT.OP.MPA.305 applies only if the RVR or VIS is reported and applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or in the FAS, as applicable.

APPLICATION OF RVR OR VIS REPORTS — HELICOPTERS

(b) There is no prohibition on the commencement of an approach based on the reported RVR. The restriction in CAT.OP.MPA.305 applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or in the final approach segment as applicable.

The prohibition to continue the approach applies only if the RVR is reported and it is below 550 m and below the operating minima. There is no prohibition based on VIS.

(c) If the reported RVR is 550 m or greater, but it is less than the RVR calculated in accordance with AMC5 CAT.OP.MPA.110, a go-around is likely to be necessary since visual reference may not be established at the DH or MDH. Similarly, in the absence of an RVR report, the reported visibility or a digital image may indicate that a go-around is likely. The commander should consider the available options, based on a thorough assessment of risk, such as diverting to an alternate, before commencing the approach.

APPLICATION OF RVR OR VIS REPORTS — ALL AIRCRAFT

(d) If a deterioration in the RVR or VIS is reported once the aircraft is below 1 000 ft or in the FAS, as applicable, then there is no requirement for the approach to be discontinued. In this situation, the normal visual reference requirements would apply at the DA/H.

(e) Where additional RVR information is provided (e.g. midpoint and stop end), this is advisory; such information may be useful to the pilot in order to determine whether there will be sufficient visual reference to control the aircraft during roll-out and taxi. For operations where the aircraft is controlled manually during roll-out, Table 1 (aeroplanes) in AMC1 SPA.LVO.100(a) and Table 3 (helicopters) in AMC2 SPA.LVO.100(a) provide an indication of the RVR (e.g. midpoint and stop end) that may be required to allow manual lateral control of the aircraft on the runway.

The following AMC1 CAT.OP.MPA.305(a) is inserted:

AMC1 CAT.OP.MPA.305(a) Commencement and continuation of approach

MINIMUM RVR FOR CONTINUATION OF APPROACH — AEROPLANES

(a) The touchdown RVR should be the controlling RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

(c) Where the RVR is not available, CMV should be used except for the purpose of continuation of an approach in LVO in accordance with AMC10 CAT.OP.MPA.110.

The following AMC1 CAT.OP.MPA.305(b) is inserted:

AMC1 CAT.OP.MPA.305(b) Commencement and continuation of approach

MINIMUM RVR FOR CONTINUATION OF APPROACH — HELICOPTERS

(a) The touchdown RVR should be the controlling RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

The following AMC1 CAT.OP.MPA.305(e) is replaced by the following:

AMC1 CAT.OP.MPA.305(c ~~e~~) Commencement and continuation of approach

VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS

~~(a) NPA, APV and CAT I operations~~

~~At DH or MDH, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot:~~

For instrument approach operations Type A and CAT I instrument approach operations Type B, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot at the MDA/H or the DA/H:

(a~~1~~) elements of the approach lighting system;

(b~~2~~) the threshold;

(c~~3~~) the threshold markings;

(d~~4~~) the threshold lights;

(e~~5~~) the threshold identification lights;

(f~~6~~) the visual glide path ~~slope~~ indicator;

(g~~7~~) the TDZ ~~touchdown zone~~ or TDZ ~~touchdown zone~~ markings;

(h~~8~~) the TDZ ~~touchdown zone~~ lights;

(i~~9~~) the FATO/runway edge lights; or

(j) for helicopter PinS approaches, the identification beacon light and visual ground reference;

(k) for helicopter PinS approaches, the identifiable elements of the environment defined on the instrument chart;

(l) for helicopter PinS approaches with instructions to 'proceed VFR', sufficient visual cues to determine that VFR criteria are met; or

(m~~10~~) other visual references specified in the operations manual.

~~(b) LTS CAT I operations~~

~~At DH, the visual references specified below should be distinctly visible and identifiable to the pilot:~~

(1) a segment of at least three consecutive lights, being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of them;

(2) this visual reference should include a lateral element of the ground pattern, such as an approach light crossbar or the landing threshold or a barrette of the touchdown zone light unless the operation is conducted utilising an approved HUDLS usable to at least 150 ft.

(c) CAT II or OTS CAT II operations

At DH, the visual references specified below should be distinctly visible and identifiable to the pilot:

(1) a segment of at least three consecutive lights being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of them;

(2) this visual reference should include a lateral element of the ground pattern, such as an approach light crossbar or the landing threshold or a barrette of the touchdown zone light unless the operation is conducted utilising an approved HUDLS to touchdown.

(d) CAT III operations

(1) For CAT IIIA operations and for CAT IIIB operations conducted either with fail-passive flight control systems or with the use of an approved HUDLS: at DH, a segment of at least three consecutive lights being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of these is attained and can be maintained by the pilot.

(2) For CAT IIIB operations conducted either with fail-operational flight control systems or with a fail-operational hybrid landing system using a DH: at DH, at least one centreline light is attained and can be maintained by the pilot.

(3) For CAT IIIB operations with no DH, there is no specification for visual reference with the runway prior to touchdown.

(e) Approach operations utilising EVS — CAT I operations

(1) At DH, the following visual references should be displayed and identifiable to the pilot on the EVS image:

(i) elements of the approach light; or

(ii) the runway threshold, identified by at least one of the following:

(A) the beginning of the runway landing surface,

(B) the threshold lights, the threshold identification lights; or

(C) the touchdown zone, identified by at least one of the following: the runway touchdown zone landing surface, the touchdown zone lights, the touchdown zone markings or the runway lights.

(2) At 100 ft above runway threshold elevation, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot without reliance on the EVS:

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

(ii) the lights or markings of the touchdown zone.

(f) Approach operations utilising EVS — APV and NPA operations flown with the CDFA technique

(1) At DH/MDH, visual references should be displayed and identifiable to the pilot on the EVS image as specified under (a).

(2) At 200 ft above runway threshold elevation, at least one of the visual references specified under (a) should be distinctly visible and identifiable to the pilot without reliance on the EVS.

The following GM1 CAT.OP.MPA.305(f) is deleted:

GM1 CAT.OP.MPA.305(f) Commencement and continuation of approach

EXPLANATION OF THE TERM 'RELEVANT'

'Relevant' in this context means that part of the runway used during the high-speed phase of the landing down to a speed of approximately 60 kt.

The following GM1 CAT.OP.MPA.312 EFVS 200 operations is inserted:

GM1 CAT.OP.MPA.312 EFVS 200 operations

GENERAL

(a) EFVS operations exploit the improved visibility provided by the EFVS to extend the visual segment of an instrument approach. EFVSs cannot be used to extend the instrument segment of an approach and thus the DH for EFVS 200 operations is always the same as for the same approach conducted without EFVS.

(b) Equipment for EFVS 200 operations

(1) In order to conduct EFVS 200 operations, a certified EFVS is used (EFVS-A or EFVS-L). An EFVS is an enhanced vision system (EVS) that also incorporates a flight guidance system and displays the image on a head-up display (HUD) or equivalent display. The flight guidance system will incorporate aircraft flight information and flight symbology.

(2) In multi-pilot operations, a suitable display of EFVS sensory imagery is provided to the pilot monitoring.

(c) Suitable approach procedures

(1) Types of approach operation are specified in AMC1 CAT.OP.MPA.312(a)(2)

EFVS 200 operations should be conducted as 3D approach operations. This may include operations based on NPA procedures, approach procedures with vertical guidance and precision approach procedures including approach operations requiring specific approvals, provided that the operator holds the necessary approvals.

(2) Offset approaches

Refer to AMC1 CAT.OP.MPA.312(a)(2).

(3) Circling approaches

EFVSs incorporate a HUD or an equivalent system so that the EFVS image of the scene ahead of the aircraft is visible in the pilot's forward external FOV. Circling operations require the pilot to maintain visual references that may not be directly ahead of the aircraft and may not be aligned with the current flight path. EFVSs cannot therefore be used in place of natural visual reference for circling approaches.

(d) Aerodrome operating minima for EFVS 200 operations determined in accordance with AMC1 CAT.OP.MPA.312(a)(8).

The performance of EFVSs depends on the technology used and weather conditions encountered. Table 1 'Operations utilising EFVS: RVR reduction' has been developed after an operational evaluation of two different EVSs both using infrared sensors, along with data and support provided by the FAA. Approaches were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. Table 1 contains conservative figures to cater for the expected performance of infrared sensors in the variety of conditions that might be encountered. Some systems may have better capability than those used for the evaluation, but credit cannot be taken for such performance in EFVS 200 operations.

(e) The conditions for commencement and continuation of the approach in accordance with CAT.OP.MPA.305

Pilots conducting EFVS 200 operations may commence an approach and continue that approach below 1 000 ft above the aerodrome or into the FAS if the reported RVR or CMV is equal to or greater than the lowest RVR minima determined in accordance with AMC1 CAT.OP.MPA.312(a)(8) and if all the conditions for the conduct of EFVS 200 operations are met.

Should any equipment required for EFVS 200 operations be unserviceable or unavailable, the conditions to conduct EFVS 200 operations would not be satisfied, and the approach should not be commenced. In the event of failure of the equipment required for EFVS 200 operations after the aircraft descends below 1 000 ft above the aerodrome or into the FAS, the conditions of CAT.OP.MPA.305 would no longer be satisfied unless the RVR reported prior to commencement of the approach was sufficient for the approach to be flown without EFVS in lieu of natural vision.

(f) EFVS image requirements at the DA/H specified in AMC1 CAT.OP.MPA.312(a)(4)

The requirements for features to be identifiable on the EFVS image in order to continue the approach below the DH are more stringent than the visual reference requirements for the same approach flown without EFVS. The more stringent standard is needed because the EFVS might not display the colour of lights used to identify specific portions of the runway and might not consistently display the runway markings. Any visual approach path indicator using colour-coded lights may be unusable.

(g) Obstacle clearance in the visual segment

The 'visual segment' is the portion of the approach between the DH or the MAPt and the runway threshold. In the case of EFVS 200 operations, this part of the approach may be flown using the EFVS image as the primary reference and obstacles may not always be identifiable on an EFVS image. The operational assessment specified in AMC1 CAT.OP.MPA.312(a)(2) is therefore required to ensure obstacle clearance during the visual segment.

(h) Visual reference requirements at 200 ft above the threshold

For EFVS 200 operations, natural visual reference is required by a height of 200 ft above the runway threshold. The objective of this requirement is to ensure that the pilot will have sufficient visual reference to land. The visual reference should be the same as that required for the same approach flown without EFVS.

Some EFVSs may have additional requirements that have to be fulfilled at this height to allow the approach to continue, such as a requirement to check that elements of the EFVS display remain correctly aligned and scaled to the external view. Any such requirements will be detailed in the AFM and included in the operator's procedures.

(i) Specific approval for EFVS

In order to use an EFVS without natural visual reference below 200 ft above the threshold, the operator needs to hold a specific approval in accordance with Part-SPA.

(j) Go-around

A go-around will be promptly executed if the required visual references are not maintained on the EFVS image at any time after the aircraft has descended below the DA/H or if the required visual references are not distinctly visible and identifiable using natural vision after the aircraft is below 200 ft. It is considered more likely that an EFVS 200 operation could result in the initiation of a go-around below DA/H than the equivalent approach flown without EFVS, and thus the operational assessment required by AMC1 CAT.OP.MPA.312(a)(2) takes into account the possibility of a balked landing.

An obstacle free zone (OFZ) may be provided for CAT I precision approach procedures. Where an OFZ is not provided for a CAT I precision approach, this will be indicated on the approach chart. NPA procedures and approach procedures with vertical guidance (APV) provide obstacle clearance for the missed approach based on the assumption that a go-around is executed at the MAPt and not below the OCH.

The following AMC1 CAT.OP.MPA.312(a)(1) is inserted:

AMC1 CAT.OP. MPA.312(a)(1) EFVS 200 operations

EQUIPMENT CERTIFICATION

For EFVS 200 operations, the aircraft should be equipped with an approach system using EFVS-A or a landing system using EFVS-L.

The following AMC1 CAT.OP.MPA.312(a)(2) is inserted:

AMC1 CAT.OP. MPA.312(a)(2) EFVS 200 operations

AERODROMES AND INSTRUMENT PROCEDURES SUITABLE FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the operator should verify the suitability of a runway before authorising EFVS operations to that runway through an operational assessment taking into account the following elements:

(1) the obstacle situation;

(2) the type of aerodrome lighting;

(3) the available IAPs;

(4) the aerodrome operating minima; and

(5) any non-standard conditions that may affect the operations.

(b) EFVS 200 operations should only be conducted as 3D operations, using an IAP in which the final approach track is offset by a maximum of 3 degrees from the extended centre line of the runway.

(c) The IAP should be designed in accordance with PANS-OPS, Volume I (ICAO Doc 8168) or equivalent criteria.

The following AMC2 CAT.OP.MPA.312(a)(2) is inserted:

AMC2 CAT.OP. MPA.312(a)(2) EFVS 200 operations

VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS 200 OPERATIONS

The operational assessment before authorising the use of a runway for EFVS 200 operations should be conducted as follows:

(a) Check whether the runway has been promulgated as suitable for EFVS operations or is certified as a precision approach runway category II or III by the State of the aerodrome. If this is so, then check whether and where the approach and runway lights installed (notably incandescent or LED lights) are adequate for the EFVS equipment used by the operator.

(b) If the check in point (a) above comes out negative (the runway is not promulgated as EFVS suitable or is not category II or III), then proceed as follows:

(1) For straight-in IAPs, US Standard for Terminal Instrument Procedures (TERPS) may be considered to be acceptable as an equivalent to PANS-OPS. If other design criteria than those in PANS-OPS or US TERPS are used, the operations should not be conducted.

(2) If an OFZ is established, this will ensure adequate obstacle protection from 960 m before the threshold. If an OFZ is not established or if the DH for the approach is above 250 ft, then check whether there is a visual segment surface (VSS).

(3) VSSs are required for procedures published after 15 March 2007, but the existence of the VSS has to be verified through the aeronautical information publication (AIP), operations manual Part C, or direct contact with the aerodrome. Where the VSS is established, it may not be penetrated by obstacles. If the VSS is not established or is penetrated by obstacles and an OFZ is not established, then the operations should not be conducted. Note: obstacles of a height of less than 50 ft above the threshold may be disregarded when assessing the VSS.

(4) Runways with obstacles that require visual identification and avoidance should not be accepted.

(5) For the obstacle protection of a balked landing where an OFZ is not established, the operator may develop an alternative lateral profile to be followed in the event of a go-around below the DA/H;

(6) Perform an assessment of the suitability of the runway which should include whether the approach and runway lights installed (notably incandescent or LED lights) are adequate for the EFVS equipment used by the operator.

(c) If the AFM stipulates specific requirements for approach procedures, then the operational assessment should verify that these requirements can be met.

The following AMC1 CAT.OP.MPA.312(a)(3) is inserted:

AMC1 CAT.OP. MPA.312(a)(3) EFVS 200 operations

INITIAL TRAINING FOR EFVS 200 OPERATIONS

Operators should ensure that flight crew members complete the following conversion training before being authorised to conduct EFVS 200 operations unless credits related to training and checking for previous experience on similar aircraft types are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012:

(a) A ground training course including at least the following:

(1) characteristics and limitations of HUDs or equivalent display systems including information presentation and symbology;

(2) EFVS sensor performance in different weather conditions, sensor limitations, scene interpretation, visual anomalies and other visual effects;

(3) EFVS display, control, modes, features, symbology, annunciations and associated systems and components;

(4) the interpretation of EFVS imagery;

(5) the interpretation of approach and runway lighting systems and display characteristics when using EFVS;

(6) pre-flight planning and selection of suitable aerodromes and approach procedures;

(7) principles of obstacle clearance requirements;

(8) the use and limitations of RVR assessment systems;

(9) normal, abnormal and emergency procedures for EFVS operations;

(10) the effect of specific aircraft/system malfunctions;

(11) human factors aspects of EFVS operations; and

(12) qualification requirements for pilots to obtain and retain approval for EFVS 200 operations.

(b) An aircraft/FSTD training course in two phases as follows:

(1) Phase one (EFVS 200 operations with aircraft and all equipment serviceable) — objectives:

(i) understand the operation of equipment required for EFVS 200 operations;

(ii) understand operating limitations of the installed EFVS;

(iii) practice the use of HUD or equivalent display systems;

(iv) practice the set-up and adjustment of EFVS equipment in different conditions (e.g. day and night);

(v) practice the monitoring of automatic flight control systems, EFVS information and status annunciators;

(vi) practice the interpretation of EFVS imagery;

(vii) become familiar with the features needed on the EFVS image to continue approach below DH;

(viii) practice the identification of visual references using natural vision while using EFVS equipment;

(ix) master the manual aircraft handling relevant to EFVS operations including, where appropriate, the use of the flare cue and guidance for landing;

(x) practice coordination with other crew members; and

(xi) become proficient at procedures for EFVS 200 operations.

(2) Phase one of the training should include the following exercises:

(i) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

(ii) the use of HUD or equivalent display systems during at least approach, landing and go-around;

(iii) approach using the EFVSs installed on the aircraft to the appropriate DH and transition to natural vision for continuing approach and landing;

(iv) approach with all engines operating using the EFVS, down to the appropriate DH followed by a missed approach, all without external visual reference, as appropriate.

(3) Phase two (EFVS 200 operations with aircraft and equipment failures and degradations) — objectives:

(i) understand the effect of known aircraft unserviceabilities including use of the MEL;

(ii) understand the effect of failed or downgraded equipment on aerodrome operating minima;

(iii) understand the actions required in response to failures and changes in the status of the EFVS including HUD or equivalent display systems;

(iv) understand the actions required in response to failures above and below the DH;

(v) practice abnormal operations and incapacitation procedures; and

(vi) become proficient at dealing with failures and abnormal situations during EFVS 200 operations.

(4) Phase two of the training should include the following exercises:

(i) approaches with engine failures at various stages of the approach;

(ii) approaches with failures of the EFVS at various stages of the approach, including failures between the DH and the height below which an approach should not be continued if natural visual reference is not acquired, require either:

(A) reversion to head down displays to control missed approach; or

(B) reversion to flight with downgraded or no guidance to control missed approaches from the DH or below, including those which may result in a touchdown on the runway;

(iii) incapacitation procedures appropriate to EFVS 200 operations;

(iv) failures and procedures applicable to the specific EFVS installation and aircraft type; and

(v) FSTD training including minimum eight approaches.

The following AMC2 CAT.OP.MPA.312(a)(3) is inserted:

AMC2 CAT.OP. MPA.312(a)(3) EFVS 200 operations

RECURRENT TRAINING AND CHECKING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the pilots' are competent to perform EFVS 200 operations. To do so, pilots should be trained every 6 months by performing at least two approaches on each type of aircraft operated.

(b) The operator should ensure that the pilots' competence to perform EFVS 200 operations is checked at each required operator proficiency check by performing at least two approaches on each type of aircraft operated, of which one should be flown without natural vision to 200 ft.

The following AMC3 CAT.OP.MPA.312(a)(3) is inserted:

AMC3 CAT.OP. MPA.312(a)(3) EFVS 200 operations

RECENT EXPERIENCE REQUIREMENTS FOR EFVS 200 OPERATIONS

Pilots should complete a minimum of four approaches using the operator's procedures for EFVS 200 operations during the validity period of the operator proficiency check unless credits related to currency are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

The following AMC4 CAT.OP.MPA.312(a)(3) is inserted:

AMC4 CAT.OP. MPA.312(a)(3) EFVS 200 operations

DIFFERENCES TRAINING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the flight crew members authorised to conduct EFVS 200 operations are provided with differences training or familiarisation whenever there is a change to any of the following:

(1) the technology used in the flight guidance and flight control system;

(2) the HUD or equivalent display systems;

(3) the operating procedures.

(b) The differences training should:

(1) meet the objectives of the appropriate initial training course;

(2) take into account the flight crew members' previous experience; and

(3) take into account the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

The following AMC5 CAT.OP.MPA.312(a)(3) is inserted:

AMC5 CAT.OP. MPA.312(a)(3) EFVS 200 operations

TRAINING FOR EFVS 200 OPERATIONS

If a flight crew member is to be authorised to operate as pilot flying and pilot monitoring during EFVS 200 operations, then the flight crew member should complete the required FSTD training for each operating capacity.

GM1 CAT.OP.MPA.312(a)(3) is inserted:

GM1 CAT.OP. MPA.312(a)(3) EFVS 200 operations

RECURRENT CHECKING FOR EFVS 200 OPERATIONS

In order to provide the opportunity to practice decision-making in the event of system failures and failure to acquire natural visual reference, the recurrent training and checking for EFVS 200 operations is recommended to periodically include different combinations of equipment failures, go-around due to loss of visual reference, and landings.

The following AMC1 CAT.OP.MPA.312(a)(4) is inserted:

AMC1 CAT.OP. MPA.312(a)(4) EFVS 200 operations

OPERATING PROCEDURES FOR EFVS 200 OPERATIONS

(a) When conducting EFVS 200 operations:

(1) the pilot flying should use the EFVS throughout the approach;

(2) in multi-pilot operations, a suitable display of EFVS sensory imagery should be provided to the pilot monitoring;

(3) the approach between the FAF and the DA/H should be flown using vertical flight path guidance;

(4) the approach may be continued below the DA/H provided that the pilot can identify on the EFVS image either:

(i) the approach light system; or

(ii) both of the following:

(A) the runway threshold identified by the beginning of the runway landing surface, the threshold lights or the runway end identifier lights;

(B) the TDZ identified by the TDZ lights, the TDZ runway markings or the runway lights; and

(5) a missed approach should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by 200 ft above the threshold.

(b) Operating procedures for EFVS 200 operations should:

(1) be consistent with the AFM;

(2) be appropriate to the technology and equipment to be used;

(3) specify the duties and responsibilities of each flight crew member in each relevant phase of flight;

(4) ensure that the flight crew workload is managed to facilitate effective decision-making and monitoring of the aircraft; and

(5) deviate to the minimum extent practicable from normal procedures used for routine operations.

(c) Operating procedures for EFVS 200 operations should include:

(1) required checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;

(2) correct seating and eye position;

(3) determination of aerodrome operating minima;

(4) required visual references at the DH;

(5) the action to be taken if natural visual reference is not acquired by 200 ft;

(6) the action to be taken in the event of loss of the required visual reference; and

(7) procedures for balked landing.

(d) Operating procedures for EFVS 200 operations should be included in the operations manual.

The following AMC1 CAT.OP.MPA.312(a)(8) is inserted:

AMC1 CAT.OP. MPA.312(a)(8) EFVS 200 operations

AERODROME OPERATING MINIMA — EFVS 200 OPERATIONS

When conducting EFVS 200 operations:

(a) the DA/H used should be the same as for operations without EFVS;

(b) the lowest RVR minima to be used should be determined by reducing the RVR presented in:

(1) Table 9 in AMC5 CAT.OP.MPA.110 in accordance with Table 1 below for aeroplanes;

(2) Table 13 in AMC6 CAT.OP.MPA.110 in accordance with Table 1 below for helicopters;

(c) in case of failed or downgraded equipment, Table 17 in AMC11 CAT.OP.MPA.110 should apply.

Table 1

Operations utilising EFVS: RVR reduction

RVR presented in Table 9 in AMC5 CAT.OP.MPA.110 and Table 13 in AMC6 CAT.OP.MPA.110	RVR (m) for EFVS 200 operations
550	550
600	550
650	550
700	550
750	550
800	550
900	600
1 000	650
1 100	750
1 200	800
1 300	900
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2 400	1 600

The following AMC1 CAT.OP.MPA.312(c) is inserted:

AMC1 CAT.OP. MPA.312(c) EFVS 200 operations

EFVS 200 WITH EVSs MEETING THE MINIMUM CRITERIA

The EVS should be certified before 1 January 2022 as ‘EVS with an operational credit’.

GM1 CAT.OP.MPA.312(c) is inserted:

GM1 CAT.OP. MPA.312(c) EFVS 200 operations

The CAA referred to in CAT.OP.MPA.312 point (c) is the competent authority for the oversight of the operator, as established in ORO.GEN.105.

GM1 CAT.POL.H.215(b)(3) is replaced by the following:

GM1 CAT.POL.H.215(b)(3) En-route — critical engine inoperative

FUEL JETTISON

The presence of obstacles along the en-route flight path may preclude compliance with point **CAT.POL.H.215(a)(1)** ~~at~~ with the planned mass at the critical point along the route. In this case, fuel jettison at the most critical point may be planned, provided that the procedures of point (d) ~~(c) in~~ of ~~**AMC3 CAT.OP.MPA.150(b)**~~ **AMC1 CAT.OP.MPA.191(b) & (c)** are complied with.

The following AMC1 CAT.POL.A.230 & CAT.POL.A.235 is deleted:

~~AMC1 CAT.POL.A.230 & CAT.POL.A.235 Landing — dry runways & Landing — wet and contaminated runways~~

~~**FACTORING OF AUTOMATIC LANDING DISTANCE PERFORMANCE DATA**~~

~~In those cases where the landing requires the use of an automatic landing system, and the distance published in the AFM includes safety margins equivalent to those contained in CAT.POL.A.230 (a)(1), CAT.POL.A.230(a)(2) and CAT.POL.A.235, the landing mass of the aeroplane should be the lesser of:~~

~~(a) the landing mass determined in accordance with CAT.POL.A.230 (a)(1), CAT.POL.A.230(a)(2) or CAT.POL.A.235, as appropriate; or~~

~~(b) the landing mass determined for the automatic landing distance for the appropriate surface condition, as given in the AFM or equivalent document. Increments due to system features such as beam location or elevations, or procedures such as use of overspeed, should also be included.~~

The following AMC1 CAT.POL.A.230 is inserted:

AMC1 CAT.POL.A.230 Landing – dry runways

FACTORING OF AUTOMATIC LANDING DISTANCE PERFORMANCE DATA

In those cases where the landing requires the use of an automatic landing system, and the distance published in the AFM includes safety margins equivalent to those contained in CAT.POL.A.230(a)(1) and CAT.POL.A.230(a)(2), the landing mass of the aeroplane should be the lesser of:

(a) the landing mass determined in accordance with CAT.POL.A.230(a)(1) and CAT.POL.A.230(a)(2); or

(b) the landing mass determined for the automatic landing distance for the appropriate surface condition, as given in the AFM or equivalent document. Increments due to system features such as beam location or elevations, or procedures such as use of overspeed, should also be included.

The following AMC2 CAT.POL.A.230 is inserted:

AMC2 CAT.POL.A.230 Landing – dry runways

FACTORING OF LANDING DISTANCE PERFORMANCE DATA WHEN USING A HEAD-UP DISPLAY (HUD) OR AN EQUIVALENT DISPLAY WITH FLARE CUE

In those cases where the landing requires the use of a HUD or an equivalent display with flare cue, and the landing distance published in the AFM includes safety factors, the landing mass of the aeroplane should be the lesser of:

(a) the landing mass determined in accordance with CAT.POL.A.230(a)(1); or

(b) the landing mass determined, when using a HUD or an equivalent display with flare cue for the appropriate surface condition, as given in the AFM or equivalent document.

The following AMC1 CAT.POL.A.235 is inserted:

AMC1 CAT.POL.A.235 Landing – wet and contaminated runways

FACTORING OF AUTOMATIC LANDING DISTANCE PERFORMANCE DATA

In those cases where the landing requires the use of an automatic landing system, and the distance published in the AFM includes safety margins equivalent to those contained in CAT.POL.A.235, the landing mass of the aeroplane should be the lesser of:

(a) the landing mass determined in accordance with CAT.POL.A.235; or

(b) the landing mass determined for the automatic landing distance for the appropriate surface condition, as given in the AFM or equivalent document. Increments due to system features such as beam location or elevations, or procedures such as use of overspeed, should also be included.

The following AMC2 CAT.POL.A.235 is inserted:

AMC2 CAT.POL.A.235 Landing – wet and contaminated runways

FACTORING OF LANDING DISTANCE PERFORMANCE DATA WHEN USING A HEAD-UP DISPLAY (HUD) OR AN EQUIVALENT DISPLAY WITH FLARE CUE

In those cases where the landing requires the use of a HUD or an equivalent display with flare cue, and the landing distance published in the AFM includes safety factors, the landing mass of the aeroplane should be the lesser of:

(a) the landing mass determined in accordance with CAT.POL.A.235; or

(b) the landing mass determined, when using a HUD or an equivalent display with flare cue for the appropriate surface condition, as given in the AFM or equivalent document.

GM1 CAT.POL.H.400(c) is replaced by the following:

GM1 CAT.POL.H.400(c) General

THE TAKE-OFF AND LANDING PHASES (PERFORMANCE CLASS 3)

(a) To understand the use of ground level exposure in performance class 3, it is important first to be aware of the logic behind the use of 'take-off and landing phases'. Once this is clear, it is easier to appreciate the aspects and limits of the use of ground level exposure. This GM shows the derivation of the term from the ICAO definition of the 'en-route phase' and then gives practical examples of the use, and limitations on the use, of ground level exposure in CAT.POL.400(c).

(b) The take-off phase in performance class 1 and performance class 2 may be considered to be bounded by 'the specified point in the take-off' from which the take-off flight path begins.

(1) In performance class 1, this specified point is defined as 'the end of the take-off distance required'.

(2) In performance class 2, this specified point is defined as DPATO or, as an alternative, no later than 200 ft above the take-off surface.

(3) There is no simple equivalent point for bounding of the landing in performance classes 1 & 2.

(c) Take-off flight path is not used in performance class 3 and, consequently, the term 'take-off and landing phases' is used to bound the limit of exposure. For the purpose of performance class 3, the take-off and landing phases are as set out in **CAT.POL.H.400(c)** and are considered to be bounded by:

(1) during take-off before reaching V_y (speed for best rate of climb) or 200 ft above the take-off surface; and

(2) during landing, below 200 ft above the landing surface.

(ICAO Annex 6 Part III, defines en-route phase as being "'That part of the flight from the end of the take-off and initial climb phase to the commencement of the approach and landing phase.' The use of take-off and landing phase in this text is used to distinguish the take-off from the initial climb, and the landing from the approach: they are considered to be compleimentary and not contradictory.)

(d) Ground level exposure — and exposure for elevated FATOs or helidecks in a non-hostile environment — is permitted for operations under an approval in accordance with **CAT.POL.H.305.** Exposure in this case is limited to the 'take-off and landing phases'.

The practical effect of bounding of exposure can be illustrated with the following examples:

(1) A clearing: the operator may consider a take-off/landing in a clearing when there is sufficient power, with all engines operating, to clear all obstacles in the take-off path by an adequate margin (this, in ICAO, is meant to indicate 35 ft). Thus, the clearing may be bounded by bushes, fences, wires and, in the extreme, by power lines, high trees, etc. Once the obstacle has been cleared, by using a steep or a vertical climb (which itself may infringe the height velocity (HV) diagram), the helicopter reaches V_y or 200 ft, and from that point a safe forced landing must be possible. The effect is that whilst operation to a clearing is possible, operation to a clearing in the middle of a forest is not (except when operated in accordance with **CAT.POL.H.420**).

(2) An aerodrome/operating site surrounded by rocks: the same applies when operating to a landing site that is surrounded by rocky ground. Once V_y or 200 ft has been reached, a safe forced landing must be possible.

(3) An elevated FATO or helideck: when operating to an elevated FATO or helideck in performance class 3, exposure is considered to be twofold: firstly, to a deck-edge strike if the engine fails after the decision to transition has been taken; and secondly, to operations in the HV diagram due to the height of the FATO or helideck. Once the take-off surface has been cleared and the helicopter has reached the knee of the HV diagram, the helicopter should be capable of making a safe forced landing.

(e) Operation in accordance with **CAT.POL.400(b)** does not permit excursions into a hostile environment as such and is specifically concerned with the absence of space to abort the take-off or landing when the take-off and landing space are limited; or when operating in the HV diagram.

(f) Specifically, the use of this exception to the requirement for a safe forced landing (during take-off or landing) does not permit semi-continuous operations over a hostile environment such as a forest or hostile sea area.

AMC2 CAT.IDE.A.190 is replaced by the following:

AMC2 CAT.IDE.A.190 Flight data recorder

OPERATIONAL PERFORMANCE REQUIREMENTS FOR AEROPLANES FIRST ISSUED WITH AN INDIVIDUAL CofA ON OR AFTER 1 APRIL 1998 AND BEFORE 1 JANUARY 2016

(a) The operational performance requirements for FDRs should be those laid down in EUROCAE Document ED-55 (Minimum Operational Performance Requirements For Flight Data Recorder Systems) dated May 1990, or EUROCAE Document ED-112 (Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems) dated March 2003, including amendments No 1 and No 2, or any later equivalent standard produced by EUROCAE.

(b) The FDR should record, with reference to a timescale:

(1) the parameters listed in Table 1a or Table 1b below, as applicable;

(2) the additional parameters listed in Table 2 below, for those aeroplanes with an MCTOM exceeding 27 000 kg;

(3) any dedicated parameters relating to novel or unique design or operational characteristics of the aeroplane as determined by the CAA and

(4) the additional parameters listed in Table 3 below, for those aeroplanes equipped with electronic display systems.

(c) The FDR of aeroplanes first issued with an individual CofA before 20 August 2002 and equipped with an electronic display system does not need to record those parameters listed in Table 3 for which:

(1) the sensor is not available;

(2) the aeroplane system or equipment generating the data needs to be modified; or

(3) the signals are incompatible with the recording system;

(d) The FDR of aeroplanes first issued with an individual CofA on or after 1 April 1998 but not later than 1 April 2001 is not required to comply with (b) above if:

(1) compliance with (a) cannot be achieved without extensive modification to the aeroplane system and equipment other than the flight recording system; and

(2) the FDR of the aeroplane can comply with **AMC4 CAT.IDE.A.190(**a) except that parameter 15b in Table 1 of **AMC4 CAT.IDE.A.190** need not be recorded.

(e) The parameters to be recorded should meet, as far as practicable, the performance specifications (ranges, sampling intervals, accuracy limits, and resolution in read-out) defined in Table 1 of **AMC3 CAT.IDE.A.190**.

(f) For aeroplanes with novel or unique design or operational characteristics, the additional parameters should be those required in accordance with applicable Certification Specifications during type or supplemental certification or validation.

(g) If recording capacity is available, as many as possible of the additional parameters specified in table II-A.1 of EUROCAE Document ED 112 dated March 2003 should be recorded.

Table 1a

FDR — Aeroplanes with an MCTOM of more than 5 700 kg

No	Parameter
1	Time or relative time count
2	Pressure altitude
3	Indicated airspeed or calibrated airspeed
4	Heading
5	Normal acceleration
6	Pitch attitude
7	Roll attitude
8	Manual radio transmission keying
9	Propulsive thrust/power on each engine and flight crew compartment thrust/power lever position if applicable
10	Trailing edge flap or flight crew compartment control selection
11	Leading edge flap or flight crew compartment control selection
12	Thrust reverse status
13	Ground spoiler position and/or speed brake selection
14	Total or outside air temperature
15	Autopilot, autothrottle and AFCS mode and engagement status
16	Longitudinal acceleration (body axis)
17	Lateral acceleration

Table 1b

FDR — Aeroplanes with an MCTOM 5 700 kg or below

No	Parameter
1	Time or relative time count
2	Pressure altitude
3	Indicated airspeed or calibrated airspeed
4	Heading
5	Normal acceleration
6	Pitch attitude
7	Roll attitude
8	Manual radio transmission keying
9	Propulsive thrust/power on each engine and flight crew compartment thrust/power lever position if applicable
10	Trailing edge flap or flight crew compartment control selection
11	Leading edge flap or flight crew compartment control selection
12	Thrust reverse status
13	Ground spoiler position and/or speed brake selection

No	Parameter
14	Total or outside air temperature
15	Autopilot/autothrottle engagement status
16	Longitudinal acceleration (body axis)
17	Angle of attack (if a suitable sensor is available)

Table 2

FDR — Additional parameters for aeroplanes with an MCTOM of more than 27 000 kg

No	Parameter
18	Primary flight controls — control surface position and/or pilot input (pitch, roll, yaw)
19	Pitch trim position
20	Radio altitude
21	Vertical beam deviation (ILS or GLS glide path or MLS elevation)
22	Horizontal beam deviation (ILS localiser or GLS lateral deviation or MLS azimuth)
23	Marker beacon passage
24	Warnings
25	Reserved (navigation receiver frequency selection or GLS channel is recommended)
26	Reserved (DME or GLS distance is recommended)
27	Landing gear squat switch status or air/ground status
28	Ground proximity warning system
29	Angle of attack
30	Low pressure warning (hydraulic and pneumatic power)
31	Groundspeed
32	Landing gear or gear selector position

Table 3

FDR — Aeroplanes equipped with electronic display systems

No	Parameter
33	Selected barometric setting (each pilot station)
34	Selected altitude
35	Selected speed
36	Selected Mach
37	Selected vertical speed
38	Selected heading
39	Selected flight path
40	Selected decision height
41	EFIS display format
42	Multi-function/engine/alerts display format

Points 21, 21a and 22a in Table 1 of AMC3 CAT.IDE.A.190 are replaced by the following:

AMC3 CAT.IDE.A.190 Flight data recorder

PERFORMANCE SPECIFICATIONS FOR THE PARAMETERS TO BE RECORDED FOR AEROPLANES FIRST ISSUEDWITH AN INDIVIDUAL CofA ON OR AFTER 1 APRIL 1998 AND BEFORE 1 JANUARY 2016

Table 1: FDR

(...)

21	Vertical beam deviation		1	As installed ±3 % recommended	0.3 % of full range	Data from all ofboth the ILS, GLS and MLS systems need not to be recorded at the same time. The approach aid in use should be recorded. For autoland/ category III operations, each radio altimeter should be recorded, but arranged so that at least one is recorded each second.
21a	ILS or GLS glide path	±0.22 DDM or available sensor range as installed				
21b	MLS elevation	0.9° to 30°				
22	Horizontal beam deviation	Signal range	1	As installed ±3 % recommended	0.3 % of full range	See parameter 21 remarks.
22a	ILS Llocaliser or GLS lateral deviation	±0.22 DDM or available sensor range as installed				
22b	MLS azimuth	±62°				

The following GM1 CAT.CAT.IDE.H.125(b) is inserted:

GM1 CAT.IDE.H.125(b) Operations under VFR by day — flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

(a) Two pilots are required for the operation if required by the one of the following:

(1) the AFM;

(2) point ORO.FC.200.

MULTI-PILOT OPERATIONS ON A VOLUNTARY BASIS — HELICOPTERS OPERATED UNDER VFR BY DAY

(b) If the AFM permits single-pilot operations, and the operator decides that the crew composition is more than one pilot, then point CAT.IDE.H.125(b) does not apply. However, additional means to display instruments referred to in CAT.IDE.H.125(b) may be required by point CAT.IDE.H.100(d).

The following GM1 CAT.CAT.IDE.H.130(h) is inserted:

GM1 CAT.IDE.H.130(h) Operations under IFR or at night – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots are required for the operation if required by the one of the following:

(a) the AFM;

(b) the operations manual.

Annex V – Part- SPA

Annex V is amended as follows:

The following AMC1 SPA.LVO.100 is deleted:

~~AMC1 SPA.LVO.100 Low visibility operations~~

~~**LVTO OPERATIONS – AEROPLANES**~~

~~For a low visibility take-off (LVTO) with an aeroplane the following provisions should apply:~~

~~(a) for an LVTO with a runway visual range (RVR) below 400 m the criteria specified in Table 1.A;~~

~~(b) for an LVTO with an RVR below 150 m but not less than 125 m:~~

~~(1) high intensity runway centre line lights spaced 15 m or less apart and high intensity edge lights spaced 60 m or less apart that are in operation;~~

~~(2) a 90 m visual segment that is available from the flight crew compartment at the start of the take-off run; and~~

~~(3) the required RVR value is achieved for all of the relevant RVR reporting points;~~

~~(c) for an LVTO with an RVR below 125 m but not less than 75 m:~~

~~(1) runway protection and facilities equivalent to CAT III landing operations are available; and~~

~~(2) the aircraft is equipped with an approved lateral guidance system.~~

~~***Table 1.A: LVTO – aeroplanes***~~

~~***RVR vs. facilities***~~

~~Facilities~~	~~RVR (m) *, **~~
~~Day: runway edge lights and runway centre line markings~~ ~~Night: runway edge lights and runway end lights or runway centre line lights and runway end lights~~	~~300~~
~~Runway edge lights and runway centre line lights~~	~~200~~
~~Runway edge lights and runway centre line lights~~	~~TDZ, MID, rollout 150***~~
~~High intensity runway centre line lights spaced 15 m or less and high intensity edge lights spaced 60 m or less are in operation~~	~~TDZ, MID, rollout 125***~~
~~Runway protection and facilities equivalent to CAT III landing operations are available and the aircraft is equipped either with an approved lateral guidance system or an approved HUD / HUDLS for take-off.~~	~~TDZ, MID, rollout 75~~

~~*: The reported RVR value representative of the initial part of the take-off run can be replaced by pilot assessment.~~

~~**: Multi-engined aeroplanes that in the event of an engine failure at any point during take-off can either stop or continue the take-off to a height of 1 500 ft above the aerodrome while clearing obstacles by the required margins.~~

~~***: The required RVR value to be achieved for all relevant RVRs~~

~~TDZ: touchdown zone, equivalent to the initial part of the take-off run~~

~~MID: midpoint~~

The following AMC3 SPA.LVO.100 is deleted:

~~AMC3 SPA.LVO.100 Low visibility operations~~

~~LTS CAT I OPERATIONS~~

~~(a) For lower than Standard Category I (LTS CAT I) operations the following provisions should apply:~~

~~(1) The decision height (DH) of an LTS CAT I operation should not be lower than the highest of:~~

~~(i) the minimum DH specified in the AFM, if stated;~~

~~(ii) the minimum height to which the precision approach aid can be used without the specified visual reference;~~

~~(iii) the applicable obstacle clearance height (OCH) for the category of aeroplane;~~

~~(iv) the DH to which the flight crew is qualified to operate; or~~

~~(v) 200 ft.~~

~~(2) An instrument landing system / microwave landing system (ILS/MLS) that supports an LTS CAT I operation should be an unrestricted facility with a straight-in course, ≤ 3° offset, and the ILS should be certified to:~~

~~(i) class I/T/1 for operations to a minimum of 450 m RVR; or~~

~~(ii) class II/D/2 for operations to less than 450 m RVR.~~

~~Single ILS facilities are only acceptable if level 2 performance is provided.~~

~~(3) The following visual aids should be available:~~

~~(i) standard runway day markings, approach lights, runway edge lights, threshold lights and runway end lights;~~

~~(ii) for operations with an RVR below 450 m, additionally touch-down zone and/or runway centre line lights.~~

~~(4) The lowest RVR / converted meteorological visibility (CMV) minima to be used are specified in Table 2.~~

~~Table 2: LTS CAT I operation minima~~

~~RVR/CMV vs. approach lighting system~~

~~DH (ft)~~	~~Class of light facility *~~			
	~~FALS~~	~~IALS~~	~~BALS~~	~~NALS~~
	~~RVR/CMV (m)~~			
~~200 – 210~~	~~400~~	~~500~~	~~600~~	~~750~~
~~211 – 220~~	~~450~~	~~550~~	~~650~~	~~800~~
~~221 – 230~~	~~500~~	~~600~~	~~700~~	~~900~~
~~231 – 240~~	~~500~~	~~650~~	~~750~~	~~1 000~~
~~241 – 249~~	~~550~~	~~700~~	~~800~~	~~1 100~~

~~*: FALS: full approach lighting system~~

~~IALS: intermediate approach lighting system~~

~~BALS: basic approach lighting system~~

~~NALS: no approach lighting system~~

The following AMC4 SPA.LVO.100 is deleted:

~~AMC4 SPA.LVO.100 Low visibility operations~~

~~**CAT II AND OTS CAT II OPERATIONS**~~

~~(a) For CAT II and other than Standard Category II (OTS CAT II) operations the following provisions should apply:~~

~~(1) The ILS / MLS that supports OTS CAT II operation should be an unrestricted facility with a straight in course (≤ 3° offset) and the ILS should be certified to class II/D/2.~~

~~Single ILS facilities are only acceptable if level 2 performance is provided.~~

~~(2) The DH for CAT II and OTS CAT II operation should not be lower than the highest of:~~

~~(i) the minimum DH specified in the AFM, if stated;~~

~~(ii) the minimum height to which the precision approach aid can be used without the specified visual reference;~~

~~(iii) the applicable OCH for the category of aeroplane;~~

~~(iv) the DH to which the flight crew is qualified to operate; or~~

~~(v) 100 ft.~~

~~(3) The following visual aids should be available:~~

~~(i) standard runway day markings and approach and the following runway lights: runway edge lights, threshold lights and runway end lights;~~

~~(ii) for operations in RVR below 450 m, additionally touch-down zone and/or runway centre line lights;~~

~~(iii) for operations with an RVR of 400 m or less, additionally centre line lights.~~

~~(4) The lowest RVR minima to be used are specified:~~

~~(i) for CAT II operations in Table 3; and~~

~~(ii) for OTS CAT II operations in Table 4.~~

~~(b) For OTS CAT II operations, the terrain ahead of the runway threshold should have been surveyed.~~

~~***Table 3: CAT II operation minima RVR vs. DH***~~

~~DH (ft)~~	~~Auto-coupled or approved HUDLS to below DH *~~	
	~~Aircraft categories A, B, C~~ ~~RVR (m)~~	~~Aircraft category D~~ ~~RVR (m)~~
~~100 – 120~~	~~300~~	~~300/350**~~
~~121 – 140~~	~~400~~	~~400~~
~~141 – 199~~	~~450~~	~~450~~

~~*: This means continued use of the automatic flight control system or the HUDLS down to a height of 80 % of the DH.~~

~~**: An RVR of 300 m may be used for a category D aircraft conducting an auto-land.~~

~~Table 4: OTS CAT II operation minima~~

~~RVR vs. approach lighting system~~

~~DH (ft)~~	~~Auto-land or approved HUDLS utilised to touchdown~~					
	~~Class of light facility~~					
	~~FALS~~		~~IALS~~	~~BALS~~	~~NALS~~
	~~Aircraft categories A – C~~	~~Aircraft category D~~	~~Aircraft categories A – D~~	~~Aircraft categories A – D~~	~~Aircraft categories A – D~~
	~~RVR (m)~~				
~~100 – 120~~	~~350~~	~~400~~	~~450~~	~~600~~	~~700~~
~~121 - 140~~	~~400~~	~~450~~	~~500~~	~~600~~	~~700~~
~~141 – 160~~	~~400~~	~~500~~	~~500~~	~~600~~	~~750~~
~~161 – 199~~	~~400~~	~~500~~	~~550~~	~~650~~	~~750~~

The following AMC6 SPA.LVO.100 is deleted:

~~AMC6 SPA.LVO.100 Low visibility operations~~

~~OPERATIONS UTILISING EVS~~

~~The pilot using a certified enhanced vision system (EVS) in accordance with the procedures and limitations of the AFM:~~

~~(a) may reduce the RVR/CMV value in column 1 to the value in column 2 of Table 6 for CAT I operations, APV operations and NPA operations flown with the CDFA technique;~~

~~(b) for CAT I operations:~~

~~(1) may continue an approach below DH to 100 ft above the runway threshold elevation provided that a visual reference is displayed and identifiable on the EVS image; and~~

~~(2) should only continue an approach below 100 ft above the runway threshold elevation provided that a visual reference is distinctly visible and identifiable to the pilot without reliance on the EVS;~~

~~(c) for APV operations and NPA operations flown with the CDFA technique:~~

~~(1) may continue an approach below DH/MDH to 200 ft above the runway threshold elevation provided that a visual reference is displayed and identifiable on the EVS image; and~~

~~(2) should only continue an approach below 200 ft above the runway threshold elevation provided that a visual reference is distinctly visible and identifiable to the pilot without reliance on the EVS.~~

~~Table 6: Operations utilising EVS~~

~~RVR/CMV reduction vs. normal RVR/CMV~~

~~RVR/CMV (m) normally required~~	~~RVR/CMV (m) utilising EVS~~
~~550~~	~~350~~
~~600~~	~~400~~
~~650~~	~~450~~
~~700~~	~~450~~
~~750~~	~~500~~
~~800~~	~~550~~
~~900~~	~~600~~
~~1 000~~	~~650~~
~~1 100~~	~~750~~

RVR/CMV (m) normally required	RVR/CMV (m) utilising EVS
1 200	800
1 300	900
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2 400	1 600
2 500	1 700
2 600	1 700
2 700	1 800
2 800	1 900
2 900	1 900
3 000	2 000
3 100	2 000
3 200	2 100
3 300	2 200
3 400	2 200
3 500	2 300
3 600	2 400
3 700	2 400
3 800	2 500
3 900	2 600
4 000	2 600
4 100	2 700
4 200	2 800
4 300	2 800
4 400	2 900
4 500	3 000
4 600	3 000
4 700	3 100
4 800	3 200
4 900	3 200
5 000	3 300

GM1 SPA.LVO.100 is replaced by the following:

GM1 SPA.LVO.100 Low - visibility operations and operations with operational credits

DOCUMENTS CONTAINING INFORMATION RELATED TO ~~LOW VISIBILITY OPERATIONS~~ LVOs AND OPERATIONS WITH OPERATIONAL CREDITS

The following documents provide further information related to low visibility operations (LVO):

(a) ICAO Annex 2 - Rules of the Air;

(b) ICAO Annex 6 - Operation of Aircraft;

(c) ICAO Annex 10 – Aeronautical Telecommunications ~~Vol. 1~~ (volume 1 – Radio Navigation Aids);

(d) ICAO Annex 14 - Aerodromes ~~Vol. 1~~ (Volume I — Aerodrome Design and Operations);

(e) ICAO Doc 8168 - PANS - OPS — Procedures For Air Navigation Services — Aircraft Operations;

(f) ICAO Doc 9365 - ~~AWO~~ Manual of All Weather Operations;

(g) ICAO Doc 9476 - Manual of surface movement guidance and control systems (SMGCS);

(h) ICAO Doc 9157 - Aerodrome Design Manual;

(i) ICAO Doc 9328 - Manual of RVR Observing and Reporting Practices;

(j) ICAO EUR Doc 013: European Guidance Material on All Weather Operations at Aerodromes ~~European Guidance Material on Aerodrome Operations under Limited Visibility Conditions~~;

(k) ECAC Doc 17, Issue 3; and

(l) CS-AWO All - weather operations.

GM2 SPA.LVO.100 is replaced by the following:

GM2 SPA.LVO.100 Low - visibility operations and operations with operational credits

ILS AND GLS CLASSIFICATION

(a) The ILS and GLS/ GBAS classification systems are ~~is~~ specified in ICAO Annex 10 and GM2 SPA.LVO.110

LOW-VISIBILITY CONDITIONS

(b) Low visibility conditions means meteorological conditions with a runway visual range (RVR) lessthan 550m.

The following AMC1 SPA.LVO.100(a) is inserted:

AMC1 SPA.LVO.100(a) Low-visibility operations and operations with operational credits

LOW-VISIBILITY TAKE-OFF (LVTO) OPERATIONS — AEROPLANES IN AN RVR OF LESS THAN 400M

(a) Required RVR

(1) For multi-engined aeroplanes which, in the event of a critical engine failure at any point during take-off, can either stop or continue the take-off to a height of 1 500ft above the aerodrome while clearing obstacles by the required margins, the criteria in Table 1 should apply:

Table 1

LVTO operations with aeroplanes — RVR versus facilities

Minimum RVR	Facilities

300m (day)	Centre line markings; and Runway edge lights.
300m (night)	Centre line markings; and Runway edge lights; and Runway end lights or centre line lights.
150m	Centre line markings; and Runway end lights; and Runway edge lights; and Runway centre line lights.
125m	Centre line markings; and Runway end lights; and Runway edge lights (spaced 60m or less); and Runway centre line lights (spaced 15 m or less).

(2) For multi-engined aeroplanes not complying with the conditions in (a)(1), there may be a need to land immediately and to see and avoid obstacles. Such aeroplanes may be operated to the take-off minima shown in Table 2 and the marking and lighting criteria shown in Table 1, provided that they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the height specified:

Table 2

LVTO operations with aeroplanes — assumed engine failure height versus RVR

Assumed engine failure height above the take-off runway (ft) versus RVR (m)	
Less than 50	Not less than 200
More than 50 but less than 100	Not less than 300

(b) The reported RVR value representative of the initial part of the take-off run can be replaced by pilot assessment.

(c) The minimum RVR value specified in Table 1 or 2 should be achieved for all reporting points representative of the parts of the runway from the point at which the aircraft commences the take-off until the calculated accelerate-stop distance from that point.

LVTO OPERATIONS — AEROPLANES IN AN RVR OF LESS THAN 125M

(d) For LVTO operations with an RVR of less than 125m, the following additional elements should apply:

(1) The runway has centre line lights spaced at intervals of 15m or less;

(2) If an ILS signal is used for lateral guidance, the ILS localiser signal meets the requirements for category III operations, unless otherwise stated in the AFM;

(3) If an ILS signal is to be used, low-visibility procedures (LVPs) include protection of the runway and, where an ILS localiser signal is used, it should include protection of the ILS-sensitive area unless otherwise stated in the AFM; and

(4) If a GLS signal is used for lateral guidance, the GLS performance type meets the requirements for category III operations (GAST D and to GBAS point to which guidance is required), unless otherwise stated in the AFM.

(e) For LVTO operations with an RVR of less than 125m, the reported RVR should be not less than the minimum specified in the AFM or, if no such minimum is specified, not less than 75m.

(f) The minimum required RVR should be achieved for all reporting points representative of the parts of the runway from the point at which the aircraft commences the take-off until the greater of the calculated take-off distance or accelerate-stop distance from that point.

(g) The reported RVR value representative of the initial part of the take-off run can be replaced by pilot assessment.

AMC2 SPA.LVO.100 is replaced by the following:

AMC2 SPA.LVO.100(a) Low-visibility operations and operations with operational credits

LVTO OPERATIONS — HELICOPTERS

~~For LVTOs with helicopters the provisions specified in Table 1.H should apply.~~

~~Table 1.H: LVTO – helicopters~~

~~RVR vs. facilities~~

~~Facilities~~	~~RVR (m)~~
~~Onshore aerodromes with IFR departure procedures~~	
~~No light and no markings (day only)~~	~~250 or the rejected take-off distance, whichever is the greater~~
~~No markings (night)~~	~~800~~
~~Runway edge/FATO light and centre line marking~~	~~200~~
~~Runway edge/FATO light, centre line marking and relevant RVR information~~	~~150~~
~~Offshore helideck *~~	
~~Two-pilot operations~~	~~250~~
~~Single-pilot operations~~	~~500~~

~~*: The take-off flight path to be free of obstacles~~

~~FATO: final approach and take-off area~~

The following should apply to LVTOs for helicopters with an RVR of less than 400m:

(a) For take-off from onshore aerodromes or operating sites with IFR departure procedures, the criteria in Table 3 should apply:

Table 3

LVTO operations with helicopters — RVR versus facilities onshore

RVR or VIS (m) *	Facilities
Not less than 250m or the rejected take-off distance, whichever is the greater	No light and no markings (day only)

RVR or VIS (m) *	Facilities
Not less than 800m	No markings (night)
Not less than 200m	Runway edge/FATO light and centre line marking
Not less than 150m	Runway edge/FATO light, centre line marking and relevant RVR information

* On PinS departures to IDF, VIS should not be less than 800m and ceiling should not be less than 250ft.

(b) For take-off from offshore helidecks where the take-off flight path is free of obstacles, the minimum RVR for take-off should not be less than:

— 500m for single-pilot operations; or

— 250m for two-pilot operations.

The following GM1 SPA.LVO.100(a) is inserted:

GM1 SPA.LVO.100(a) Low-visibility operations and operations with operational credits

CLASSIFICATION OF LVTO OPERATIONS

Take-off operations are classified as 'normal take-off operations' with an RVR at or above 550m and 'LVTO operations' with an RVR below 550m. Only LVTO operations in an RVR of less than 400m require a specific approval.

The following GM2 SPA.LVO.100(a) is inserted:

GM2 SPA.LVO.100(a) Low-visibility operations and operations with operational credits

VISUAL SEGMENT FOR TAKE-OFF

The value of 125m RVR for take-off with 15m centre line light spacing has been selected because flight deck geometry means that this will provide at least a 90-m visual segment for the large majority of aircraft types. In a 90-m visual segment the pilot is expected to be able to see six centre line light intervals (seven centre line lights) at 15m spacing once lined up on the runway centre line.

The following AMC1 SPA.LVO.100(b) is inserted:

AMC1 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

INSTRUMENT APPROACH OPERATIONS IN LOW-VISIBILITY CONDITIONS — CAT II OPERATIONS

For CAT II operations, the following should apply:

(a) The DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance and be not lower than the highest of:

(1) the minimum DH specified in the AFM, if stated;

(2) the applicable obstacle clearance height (OCH) for the category of aircraft;

(3) the DH to which the flight crew is qualified to operate; or

(4) 100ft.

(b) The lowest RVR minima to be used are specified in Table 4:

Table 4

CAT II operation minima: RVR (m) versus DH (ft)

Aircraft categories		Auto-coupled or HUD to below DH*	
		A, B, C	**D**
DH (ft)	100–120	300	300/350*
	121–140	400	400
	141–199	450	450

*: An RVR of 300 m may be used for a Category D aeroplane conducting an autoland or using HUDLS to touchdown.

AMC5 SPA.LVO.100 is replaced by the following:

~~AMC5~~ AMC2 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

INSTRUMENT APPROACH OPERATIONS IN LOW-VISIBILITY CONDITIONS — CAT III OPERATIONS

~~The following provisions should apply to~~ For CAT III operations, the following should apply:

(a) ~~Where the DH and RVR do not fall within the same category, the RVR should determine in whichcategory the operation is to be considered.~~

(b) For operations in which a DH is used, the DH should be determined by the use of a radioaltimeter or other device capable of providing equivalent performance and be not lower than:

(1) the minimum DH specified in the AFM, if stated;

(2) the DH to which the flight crew is qualified to operate. ~~the minimum height to which theprecision approach aid can be used without the specified visual reference; or~~

(3) ~~the DH to which the flight crew is qualified to~~

~~operate.~~

(b)~~(c)~~ Operations with no DH should only be conducted if:

(1) ~~the~~ operation with no DH is specified in the AFM;

(2) there is no published information indicating that the approach aid or aerodrome facilitiescannot support operations with no DH; and ~~the approach aid and the aerodrome facilitiescan support operations with no DH; and~~

(3) the flight crew is qualified to operate with no DH.

(c)~~(d)~~ The lowest RVR ~~minima~~ to be used ~~are specified in Table 5.~~ should be determined in accordancewith Table 5:

.

~~***Table 5: CAT III operations minima***~~

~~***RVR vs. DH and rollout control/guidance system***~~

~~CAT~~	~~DH (ft) *~~	~~Rollout control/guidance system~~	~~RVR (m)~~
~~IIIA~~	~~Less than 100~~	~~Not required~~	~~200~~
~~IIIB~~	~~Less than 100~~	~~Fail-passive~~	~~150**~~
~~IIIB~~	~~Less than 50~~	~~Fail-passive~~	~~125~~
~~IIIB~~	~~Less than 50 or no DH~~	~~Fail-operational ***~~	~~75~~

~~*: Flight control system redundancy is determined under CS-AWO by the minimum certified DH.~~

~~**: For aeroplanes certified in accordance with CS-AWO 321(b)(3) or equivalent.~~

~~***: The fail-operational system referred to may consist of a fail-operational hybrid system.~~

Table 5

CAT III operation minima: RVR (m) versus DH (ft)

DH (ft)	Roll-out control/guidance system	RVR (m)*
50-99	Not required	175
0-49 or no DH	Fail-passive	125
	Fail-operational	75

* Note: For a fail-passive or HUD roll-out control system, a lower RVR value (no lower than 75m) can be used if stated in the AFM provided that the equipment demonstrated such capability as part of the certification process. This is provided that the operator has implemented the appropriate operating procedures and training.

AMC7 SPA.LVO.100 is replaced by the following:

~~AMC7~~ AMC3 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

INSTRUMENT APPROACH OPERATIONS IN LOW-VISIBILITY CONDITIONS — EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED EQUIPMENT FOR APPROACH OPERATIONS

(a) ~~General~~

~~These instructions are intended for use both pre-flight and in-flight. It is however not expected that the pilot-in-command/commander would consult such instructions after passing 1 000 ft above the aerodrome. If failures of ground aids are announced at such a late stage, the approach could be continued at the pilot-in-command/commander's discretion. If failures are announced before such a late stage in the approach, their effect on the approach should be considered as described in Table 7, and the approach may have to be abandoned.~~

Only those facilities mentioned in Table 6 should be acceptable to be used to determine the effect of temporarily failed of downgraded equipment on the required RVR for CAT II/III approach operations.

(b) The following conditions should be ~~applicable to the tables below~~ applied to Table 6:

(1) multiple failures of runway/FATO lights other than those indicated in Table 6~~7~~ are not acceptable;

(2) ~~deficiencies~~ failiures of approach and runway/FATO lights ~~are treated separately;~~ are acceptable at the same time, and the most demanding consequence should be applied;

(3) for ~~CAT II and CAT III~~approach operations with a DH below 200 ft, a combination of deficiencies in runway/FATO lights and RVR assessment equipment are not permitted; and

(4) failures other than ILS, GLS and MLS affect the RVR only and not the DH.

Table 6~~7~~

Failed or downgraded equipment — ~~affect~~ effect on landing minima
~~Operations with an LVO approval~~ CAT II/III operations

	Failed or downgraded equipment	Effect on landing minima			
		CAT III~~B~~ ~~(~~no DH~~)~~	CAT III~~B~~ DH<50ft	CAT III~~A~~ DH ≥ 50ft	CAT II
~~Failed or downgraded equipment~~	~~ILS/MLS~~ Navaid stand-by transmitter	Not allowed	RVR 200m	No effect	
	Outer marker (ILS)	No effect if ~~replaced by height check at 1 000 ft~~ the required height versus glide path can be checked using other means, e.g. DME fix			
	Middle marker (ILS)	No effect			
	DME	No effect if replaced by RNAV (GNSS) information or the outer marker.			
	RVR assessment systems	At least one RVR value to be available on the aerodrome	On runways equipped with two or more RVR assessment units, one may be inoperative		

Failed or downgraded equipment	Effect on landing minima			
	CAT III~~B (~~no DH~~)~~	CAT III~~B~~ DH<50ft	CAT III~~A~~ DH ≥ 50ft	CAT II
Approach lights	No effect	Not allowed for operations with DH >50ft		Not allowed
Approach lights except the last 210m	No effect			Not allowed
Approach lights except the last 420m	No effect			
Standby power for approach lights	No effect			
Standby power for runway lights with 1-second switchover time	**No effect**	Not allowed	**Day:** RVR 550m	**Day:** RVR 550m
	No effect		**Night:** RVR 550m	**Night:** RVR 550m
~~Edge lights, threshold lights and runway end lights~~	~~No effect~~		~~**Day:** no effect~~	~~**Day:** no effect~~
			~~**Night:** RVR 550 m~~	~~**Night:** not allowed~~
Edge lights	No effect	**Day:** no effect	**Day:** no effect	**Day:** no effect
		Night: RVR 550 m	**Night:** RVR 550 m	**Night:** not allowed
Threshold lights	No effect	No effect	**Day:** no effect	**Day:** no effect
			Night: RVR 550m	**Night:** not allowed
Runway end lights	No effect if centre line lights are serviceable			
Centre line lights	**Day:** RVR 200m	Not allowed	**Day:** RVR 300m	**Day:** RVR 350m
	Night: not allowed		**Night:** RVR 400m	**Night:** RVR 550m (400m with HUD~~LS~~ or autoland)
Centre line lights spacing increased to 30m	RVR 150m		No effect	
~~Touchdown~~ TDZ lights	No effect	**Day:** RVR 200 m	**Day:** RVR 300m	
		Night: RVR 300m	**Night:** RVR 550 m, 350m with HUD~~LS~~ or autoland	
Taxiway light system	No effect			

Table 7

Failed or downgraded equipment —effect on landing minima

Operational credits

Failed or downgraded equipment		Effect on landing minima			
		SA CAT I	**SA CAT II**	**EFVS-A**	**EFVS-L**
Failed or downgraded equipment	Navaid stand-by transmitter	No effect			
	Outer marker (ILS)	No effect if replaced by height check at 1 000 ft			
	Middle marker (ILS)	No effect			
	RVR assessment systems	On runways equipped with two or more RVR assessment units, one may be inoperative			
	Approach lights	As per Table 8	As per Table 9	As per IAP	As per IAP
	Approach lights except the last 210m	As per Table 8	As per Table 9	As per IAP	As per IAP
	Approach lights except the last 420m	As per Table 8	As per Table 9	As per IAP	As per IAP
	Standby power for approach lights	No effect			
	Edge lights	**Day**: No effect	**Day:** no effect	As per IAP	As per IAP
		Night: not allowed	**Night:** RVR 550m	As per IAP	As per IAP
	Threshold lights	**Day**: No effect	**Day:** no effect	As per IAP	As per IAP
		Night: not allowed	**Night:** RVR 550m	As per IAP	As per IAP
	Runway end lights	No effect if centre line lights are serviceable		As per IAP	
	Centre line lights	**Day:** RVR 400 m	**Day:** RVR 350m	As per IAP	As per IAP
		Night: RVR 550	**Night:** RVR 400 m	As per IAP	As per IAP
	Centre line lights spacing increased to 30m	No effect	No effect	As per IAP	As per IAP
	TDZ lights	**Day:** no effect	**Day:** RVR 350 m	As per IAP	
		Night: no effect	**Night:** RVR 350 m	As per IAP	
	Taxiway light system	No effect			

The following GM1 SPA.LVO.100(b) is inserted:

GM1 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

INSTRUMENT APPROACH OPERATIONS IN LOW-VISIBILITY CONDITIONS — CLASSIFICATION OF STANDARD APPROACH OPERATIONS

The different types of approach and landing operations are classified according to the lowest DH (or MDH) and RVR applicable to the approach type. The classification of approach types does not depend on the technology used for the approach. The lowest minima specified do not take account of 'operational credits' that may allow for lower operating minima.

The classification does not subdivide CAT III operations into CAT IIIA, IIIB, and IIIC. The actual minima applicable to any operation depends on the aircraft equipment and the specific LVO approval held by the air operator.

The AFM for aircraft certified for CAT III operations will state the lowest usable DH, or no DH. Some AFMs may refer to the previous ICAO classifications as follows:

- CAT IIIA: a DH lower than 30m (100ft) or no DH and an RVR not less than 175m;
- CAT IIIB: a DH lower than 15m (50ft) or no DH and an RVR less than 175m but not less than 50m; and
- CAT IIIC: no DH and no RVR limitations.

Where an operational credit allows operation to lower-than-standard minima, this is not considered a separate approach classification.

The following GM2 SPA.LVO.100(b) is inserted:

GM2 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

INSTRUMENT APPROACH OPERATIONS IN LOW-VISIBILITY CONDITIONS — EQUIPMENT CERTIFICATION FOR LOW-VISIBILITY APPROACH OPERATIONS OTHER THAN EFVS

This GM describes the certification requirements of CS-AWO. Operators should always refer to CS-AWO for the actual requirements.

Aircraft suitable for low-visibility approach operations are certified according to the minimum usable DH which is stated in the AFM.

Certification specifications (CS-AWO) allow for systems to be certified for SA CAT I, CAT II or CAT III operations. Systems certified for CAT III operations may specify:

- a lowest usable DH of:
  - less than 100 ft but not less than 50ft;
  - less than 50 ft; or
- no DH.

Legacy systems may be described as capable of 'CAT 3A' or 'CAT IIIA' operations. This implies a minimum DH of less than 100ft but not less than 50 ft. Systems described as capable of 'CAT 3B' or 'CAT IIIB' may be certified for a DH of less than 50 ft or no DH.

Operations to a DH of less than 100 ft but not less than 50ft will typically require a fail-passive automatic landing system or a HUDLS or equivalent system. Operations to a DH of less than 50 ft will require a fail-operational landing system, a fail-passive go-around system, automatic thrust control and either automatic ground roll control or ground roll guidance using a HUDLS. For no DH operations, a fail-passive or fail-operational ground roll control system is required.

The RVR required for SA CAT I, CAT II and SA CAT II approach operations is determined by the DH and the aircraft approach speed category. The RVR required for CAT III approach operations is determined by the DH and the capability of the ground-roll control system. Operations with fail-passive roll control systems require a greater RVR than operations with fail-operational ground control systems because the pilots would need to have sufficient visibility to maintain lateral control in the event of a system failure.

GM1 SPA.LVO.100(c), (e) is replaced by the following:

~~GM1~~ GM3 SPA.LVO.100(b) ~~(c),(e)~~ Low visibility operations and operations with operational credits

INSTRUMENT APPROACH OPERATIONS IN LOW-VISIBILITY CONDITIONS — ESTABLISHMENT OF MINIMUMRVR FOR ~~CAT II AND CAT III~~ APPROACH OPERATIONS WITH A DH BELOW 200 ft

(a) General

(1) When establishing minimum RVR for CAT II and CAT III operations, operators should pay attention to the following information that originates in ECAC Doc 17 3rd Edition, Subpart A. It is retained as background information and, to some extent, for historical purposes although there may be some conflict with current practices.

(2) Since the inception of precision approach and landing operations various methods have been devised for the calculation of aerodrome operating minima in terms of DH and RVR. It is a comparatively straightforward matter to establish the DH for an operation but establishing the minimum RVR to be associated with that DH so as to provide a high probability that the required visual reference will be available at that DH has been more of a problem.

(3) The methods adopted by various States to resolve the DH/RVR relationship in respect of CAT II and CAT III operations have varied considerably. In one instance there has been a simple approach that entailed the application of empirical data based on actual operating experience in a particular environment. This has given satisfactory results for application within the environment for which it was developed. In another instance a more sophisticated method was employed which utilised a fairly complex computer programme to take account of a wide range of variables. However, in the latter case, it has been found that with the improvement in the performance of visual aids, and the increased use of automatic equipment in the many different types of new aircraft, most of the variables cancel each other out and a simple tabulation can be constructed that is applicable to a wide range of aircraft. The basic principles that are observed in establishing the values in such a table are that the scale of visual reference required by a pilot at and below DH depends on the task that he/she has to carry out, and that the degree to which his/her vision is obscured depends on the obscuring medium, the general rule in fog being that it becomes more dense with increase in height. Research using flight simulation training devices (FSTDs) coupled with flight trials has shown the following:

(i) most pilots require visual contact to be established about 3 seconds above DH though it has been observed that this reduces to about 1 second when a fail-operational automatic landing system is being used;

(ii) to establish lateral position and cross-track velocity most pilots need to see not less than a three light segment of the centre line of the approach lights, or runway centre line, or runway edge lights;

(iii) for roll guidance most pilots need to see a lateral element of the ground pattern, i.e. an approach light cross bar, the landing threshold, or a barrette of the touchdown zone light; and

(iv) to make an accurate adjustment to the flight path in the vertical plane, such as a flare, using purely visual cues, most pilots need to see a point on the ground which has a low or zero rate of apparent movement relative to the aircraft.

(v) With regard to fog structure, data gathered in the United Kingdom over a 20 year period have shown that in deep stable fog there is a 90 % probability that the slant visual range from eye heights higher than 15ft above the ground will be less than the horizontal visibility at ground level, i.e. RVR. There are at present no data available to show what the relationship is between the slant visual range and RVR in other low visibility conditions such as blowing snow, dust or heavy rain, but there is some evidence in pilot reports that the lack of contrast between visual aids and the background in such conditions can produce a relationship similar to that observed in fog.

(b) CAT II operations

The selection of the dimensions of the required visual segments that are used for CAT II operations is based on the following visual provisions:

(1) a visual segment of not less than 90m will need to be in view at and below DH for pilot to be able to monitor an automatic system;

(2) a visual segment of not less than 120m will need to be in view for a pilot to be able to maintain the roll attitude manually at and below DH; and

(3) for a manual landing using only external visual cues, a visual segment of 225m will be required at the height at which flare initiation starts in order to provide the pilot with sight of a point of low relative movement on the ground.

Before using a CAT II ILS for landing, the quality of the localiser between 50ft and touchdown should be verified.

(c) CAT III fail-passive operations

(1) CAT III operations utilising fail-passive automatic landing equipment were introduced in the late 1960s and it is desirable that the principles governing the establishment of the minimum RVR for such operations be dealt with in some detail.

(2) During an automatic landing the pilot needs to monitor the performance of the aircraft system, not in order to detect a failure that is better done by the monitoring devices built into the system, but so as to know precisely the flight situation. In the final stages the pilot should establish visual contact and, by the time the pilot reaches DH, the pilot should have checked the aircraft position relative to the approach or runway ~~centreline~~ centre line lights. For this the pilot will need sight of horizontal elements (for roll reference) and part of the touchdown area. The pilot should check for lateral position and cross-track velocity and, if not within the pre-stated lateral limits, the pilot should carry out a missed approach procedure. The pilot should also check longitudinal progress and sight of the landing threshold is useful for this purpose, as is sight of the touchdown zone lights. and sight of the landing threshold is useful for this purpose, as is sight of the TDZ lights.

Where a fail-operational automatic landing and roll-out system is used, it is not considered necessary for the pilot to check the lateral position and cross-track velocity and thus it is not necessary for the visual reference requirements to include horizontalelements of the lighting system.

(3) In the event of a failure of the automatic flight guidance system below DH, there are two possible courses of action; the first is a procedure that allows the pilot to complete the landing manually if there is adequate visual reference for him/her to do so, or to initiate a missed approach procedure if there is not; the second is to make a missed approach procedure mandatory if there is a system disconnect regardless of the pilot's assessment of the visual reference available:

(i) If the first option is selected then the overriding rule in the determination of a minimum RVR is for sufficient visual cues to be available at and below DH for the pilot to be able to carry out a manual landing. Data presented in ECAC Doc 17 showed that a minimum value of 300 m would give a high probability that the cues needed by the pilot to assess the aircraft in pitch and roll will be available and this should be the minimum RVR for this procedure.

(ii) The second option, to require a missed approach procedure to be carried out should the automatic flight-guidance system fail below DH, will permit a lower minimum RVR because the visual reference provision will be less if there is no need to provide for the possibility of a manual landing. However, this option is only acceptable if it can be shown that the probability of a system failure below DH is acceptably low. It should be recognised that the inclination of a pilot who experiences such a failure would be to continue the landing manually but the results of flight trials in actual conditions and of simulator experiments show that pilots do not always recognise that the visual cues are inadequate in such situations and present recorded data reveal that pilots' landing performance reduces progressively as the RVR is reduced below 300m. It should further be recognised that there is some risk in carrying out a manual missed approach procedure from below 50ft in very low visibility and it should therefore be accepted that if an RVR lower than 300m is to be approved, the flight deck procedure should not normally allow the pilot to continue the landing manually in such conditions and the aircraft system should be sufficiently reliable for the missed approach procedure rate to be low.

(4) These criteria may be relaxed in the case of an aircraft with a fail-passive automatic landing system that is supplemented by a head-up display that does not qualify as a fail-operational system but that gives guidance that will enable the pilot to complete a landing in the event of a failure of the automatic landing system. In this case it is not necessary to make a missed approach procedure mandatory in the event of a failure of the automatic landing system when the RVR is less than 300m.

(d) CAT III fail-operational operations - with a DH

(1) For CAT III operations utilising a fail-operational landing system with a DH, a pilot should be able to see at least one centre line light.

(2) For CAT III operations utilising a fail-operational hybrid landing system with a DH, a pilot should have a visual reference containing a segment of at least three consecutive lights of the runway centre line lights.

(e) CAT III fail operational operations - with no DH

(1) For CAT III operations with no DH the pilot is not required to see the runway prior to touchdown. The permitted RVR is dependent on the level of aircraft equipment.

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

The following GM4 SPA.LVO.100(b) is inserted:

GM4 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

INSTRUMENT APPROACH OPERATIONS IN LOW-VISIBILITY CONDITIONS — EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED EQUIPMENT FOR APPROACH OPERATIONS

The instructions for the effect on landing minima of temporarily failed or downgraded equipment are intended for use both before flight and during flight. It is, however, not expected that the pilot-in-command/commander would consult such instructions after passing 1 000 ft above the aerodrome. If failures of ground aids are announced at such a late stage, the approach could be continued at the pilot-in-command/commander's discretion. If failures are announced before such a late stage in the approach, their effect on the approach should be considered as described in Table 6, and the approach may have to be abandoned.

The following AMC1 SPA.LVO.100(c) is inserted:

AMC1 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONS WITH OPERATIONAL CREDITS — SPECIAL AUTHORISATION CATEGORY I (SA CAT I)

For special authorisation category I (SA CAT I) operations, the following should apply:

(a) The DH of an SA CAT I operation should not be lower than the highest of:

(1) the minimum DH specified in the AFM, if stated;

(2) the applicable OCH for the category of aeroplane;

(3) the DH to which the flight crew is qualified to operate; or

(4) 150ft.

(b) Where the DH for an SA CAT I operation is less than 200 ft, it should be determined by the use of a radio altimeter or other device capable of providing equivalent performance.

(c) The following visual aids should be available:

(1) approach lights as specified in Table 8;

(2) precision approach (PA) runway markings;

(3) category I runway lights.

(d) The lowest RVR should not be lower than the higher of:

(1) the minimum RVR specified in the AFM, if stated; or

(2) the RVR specified in Table 8.

Table 8

SA CAT I operation minima RVR (m) versus approach lighting system

Class of light facility	FALS	IALS	BALS	NALS

DH (ft)	150–160	400	500	600	700
	161–200	450	550	650	750
	201–210	450	550	650	750
	211–220	500	550	650	800
	221–230	500	600	700	900
	231–240	500	650	750	1 000
	241–249	550	700	800	1 100

Note: For class of approach lighting facility, see GM2 CAT.OP.MPA.110.

The following AMC2 SPA.LVO.100(c) is inserted:

AMC2 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONS WITH OPERATIONAL CREDITS — SPECIAL AUTHORISATION CATEGORY II (SA CAT II)

For special authorisation category II (SA CAT II) operations, the following should apply:

(a) The DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance, if so, determined by the aircraft certification process, and be not lower than the highest of:

(1) the minimum DH specified in the AFM, if stated;

(2) the applicable OCH for the category of aeroplane;

(3) the DH to which the flight crew is qualified to operate; or

(4) 100ft.

(b) The following visual aids should be available:

(1) approach lights as specified in Table 9;

(2) precision approach runway markings;

(3) category I runway lights.

(c) The lowest RVR minima to be used are specified in Table 9:

Table 9

SA CAT II operation minima: RVR (m) versus DH (ft)

Class of light facility		FALS	IALS	BALS	NALS
DH (ft)	100–120	350	450	600	700
	121–140	400	500	600	700
	141–160	400	500	600	750
	161–199	400	550	650	750

The following AMC3 SPA.LVO.100(c) is inserted:

AMC3 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONS WITH OPERATIONAL CREDITS — EFVS OPERATIONS TO A RUNWAY

When conducting EFVS operations to a runway:

(a) the DA/H used should be the same as for operations without EFVS;

(b) the lowest RVR minima to be used should be determined:

(1) in accordance with criteria specified in the AFM for the expected weather conditions; or

(2) if no such criteria are specified, by reducing the RVR determined for operation without the use of EFVS/CVS in accordance with Table 10;

(c) where the lowest RVR to be used, determined in accordance with (b), is less than 550m, then this should be increased to 550 m unless LVPs are established at the aerodrome of intended landing;

(d) where the EFVS is part of a CVS, it is only the EFVS element that should provide the operational credits. The other part of the CVS, the synthetic vision system (SVS), should not provide operational credits.

Table 10

Operations using EFVS/CVS — RVR/CMV reduction

RVR/CMV (m) required without the use of EFVS	RVR/CMV (m) with the use of EFVS
550	350*
600	400*
650	450*
700	450*
750	500*
800	550
900	600
1 000	650
1 100	750
1 200	800
1 300	900
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100

RVR/CMV (m) required without the use of EFVS	RVR/CMV (m) with the use of EFVS
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2 400	1 600
* Reported RVR should be available (no CMV conversion).	

The following AMC4 SPA.LVO.100(c) is inserted:

AMC4 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONS WITH OPERATIONAL CREDITS — HELICOPTER SPECIAL AUTHORISATION CATEGORY I (HELI SA CAT I) OPERATIONS

For HELI SA CAT I operations, the following should apply:

(a) HELI SA CAT I operations should only be conducted to a runway with an approach lighting system. The following visual aids should be available:

(1) standard runway day markings, approach lights, runway edge lights, threshold lights, and runway end lights;

(2) for operations with an RVR below 450m, runway centre line markings.

(b) An ILS/MLS that supports a HELI SA CAT I operation should be an unrestricted facility.

(c) The helicopter should be:

(1) equipped with a 3-axis autopilot capable of flying the approach to the minima;

(2) able to maintain Vy in IMC on a coupled Type B approach;

(3) equipped with a radio altimeter or other device capable of providing equivalent performance; and

(4) equipped with two independent navigation aids capable of Type B CAT I approaches and certified for CAT I.

(d) The DH of a HELI SA CAT I operation should not be lower than the highest of:

(1) the minimum DH specified in the AFM, if stated;

(2) the minimum height to which the PA aid can be used without the specified visual reference;

(3) the applicable OCH for Category A aeroplanes or the OCH for Category H if available;

(4) the DH to which the flight crew is qualified to operate;

(5) 130ft on a CAT II landing system;

(6) 150ft on a CAT I ILS certified to Class I/C/1 or MLS certified to 100ft/E/1; or

(7) 200ft on other landing systems;

(8) 200ft unless the autopilot is a 4-axis autopilot with automatic level-off capability.

(e) The lowest RVR minima to be used are specified in Table 11.

Table 11

HELI SA CAT I operation minima

RVR versus approach lighting system				
DH (ft)	**Class of light facility**			
	FALS	**IALS**	**BALS**	**NALS**
201–250	450	650	750	1 000
181–200	300	450	650	900
151–180	300	350	550	750
130–150	300	300	400	600

(f) Operations

(1) The minimum crew should be two pilots or one pilot and a technical crew member. The technical crew member should be seated in the front seat and be allocated no other task than assisting the pilot, from the initial approach fix (IAF) onwards.

(2) On a CAT II landing system, the flight crew should use the radio altimeter or other equivalent device for the determination of the DH.

(3) On a CAT I ILS, the flight crew should use the altimeter for the determination of the DH. The crew should cross-check the altitude with the radio altimeter or equivalent device, considering the local geography.

(4) The AFCS and radio altimeter should be serviceable prior to commencing the approach.

(5) The approach should be flown in coupled 4-axis mode down to minima or below.

(6) The flight crew should promptly initiate a go-around if any of the following conditions are met below a 1 000ft height:

(i) discrepancy in altitude/radio altitude information;

(ii) discrepancy in navigation information;

(iii) partial or total failure of an AFCS system or navigation system;

(iv) deviation of ¼ scale or more on the landing system navigation display.

(7) The planning minima at the alternate where a HELI SA CAT I approach is envisaged should be as defined in Table 12.

Table 12

Planning minima at the alternate with HELI SA CAT I operations

Type of approach	Aerodrome ceiling	Weather minima RVR/VIS
Two or more usable Type B instrument approach operations* **	DA/H* + 100 ft	RVR** + 300 m
One usable Type B instrument approach operation	DA/H + 150 ft	RVR + 450 m

* The higher of the usable DA/H or MDA/H.

** The higher of the usable RVR or VIS.

*** Compliance with CAT.OP.MPA.192(d) should be ensured.

(8) Under commercial air transport, if no other alternate is selected and the weather forecast at destination is not based on Part-MET of UK Regulation (EU) 2017/373, the planning minima at the alternate where a HELI SA CAT I approach is envisaged should be as defined in Table 13.

Table 13

Planning minima at the alternate with HELI SA CAT I operations with alternative weather source at destination

Type of approach	Aerodrome ceiling	Weather minima RVR/VIS
Two or more usable Type B instrument approach operations * **	DA/H * + 200ft	RVR** + 600m
One usable Type B instrument approach operation	DA/H +300ft	RVR+ 900m

* The higher of the usable DA/H or MDA/H.

** The higher of the usable RVR or VIS.

*** Compliance with CAT.OP.MPA.192(d) should be ensured.

(g) Crew training and competency

(1) Under CAT, NCC and SPO, the aerodrome used for HELI SA CAT I operations should be considered as a Category C aerodrome under ORO.FC.105.

(2) A crew member should undergo training to determine the eligibility of a HELI SA CAT I approach as determined under points (a) to (c), and to determine the applicable minima under points (d) and (e).

(3) A crew member should have the relevant knowledge to implement the operating procedures described in point (f)

(4) A crew member that is involved in HELI SA CAT I operations should undergo initial and recurrent training to proficiency using a suitable FSTD, including one approach and landing and one go-around using the lowest minima defined in points (d) and (e).

(5) The recurrent training should have a validity of 6 calendar months. The validity period should be counted from the end of the month when the check was taken. When the training is undertaken within the last 3 months of the validity period, the new validity period should be counted from the previous expiry date.

(6) In addition to (5), a technical crew member that is involved in HELI SA CAT I operations should be trained to perform navigation and monitoring functions under IFR, as described

under AMC3 SPA.NVIS.130(f). The training and checking should include all of the following on the given helicopter type:

(i) initial and recurrent general training;

(ii) initial and recurrent monitoring training;

(iii) initial and recurrent navigation training;

(iv) initial and recurrent aircraft/FSTD training focusing on crew cooperation with the pilot;

(v) line flying under supervision (LIFUS);

(vi) initial and recurrent operator proficiency checks, which should meet all of the following criteria:

(A) the technical crew member should complete an operator proficiency check to demonstrate competence in carrying out normal, abnormal and emergency procedures, covering the relevant aspects associated with the flight operational tasks described in the operations manual and not covered in the line check;

(B) the initial training course should include an operator proficiency check;

(C) the operator proficiency check should be valid for a given helicopter type. In order to consider an operator proficiency check to be valid for several helicopter types, the operator should demonstrate that the types are sufficiently similar from the technical crew member's perspective;

(D) the validity period of the operator proficiency check should be 12 calendar months. The validity period should be counted from the end of the month when the check was performed. When the operator proficiency check is undertaken within the last 3 months of the validity period, the new validity period shall be counted from the original expiry date;

(E) the operator proficiency check should be conducted by a suitably qualified instructor nominated by the operator to conduct flight crew operator proficiency checks;

(vii) initial and recurrent line checks, which should meet all of the following criteria:

(A) the line check should be performed on the helicopter;

(B) the technical crew member should demonstrate competence in carrying out normal operations described in the operator's operations manual;

(C) the line check should take place after the completion of the LIFUS;

(D) the validity period of the line check should be 12 calendar months. The validity period should be counted from the end of the month when the check was performed. When the line check is undertaken within the last 3 months of the validity period, the new validity period should be counted from the original expiry date;

(E) the line check should be conducted by a suitably qualified commander nominated by the operator;

(F) any task-specific items may be checked by a suitably qualified technical crew member nominated by the operator and trained in CRM concepts and the assessment of non-technical skills.

The following GM1 SPA.LVO.100(c) is inserted:

GM1 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

THE CONCEPT OF OPERATIONS WITH OPERATIONAL CREDITS

For each specific class of standard take-off or approach operations, a standard combination of airborne equipment, aerodrome infrastructure and equipment, and procedures (system components) needs to be available to ensure the required performance of the total system. In real-life operations, one or more system components may exceed the required standard performance. The aim of the concept of operations with operational credits is to exploit such enhanced performance to provide operational flexibility beyond the limits of standard operations.

In certain circumstances it may be possible to achieve the required system performance without some standard items being available by using other enhanced equipment or procedures. In order to apply an operational credit, it is necessary that the equipment or procedures employed mitigate effectively the shortcomings in other system components. Another application of operational credits is to use the enhanced performance of certain system components to allow operations to lower than the standard minima. For approach operations, an operational credit can be applied to the instrument or the visual segment or both.

Where an operational credit allows operation to lower than standard minima, this is not considered a separate approach classification.

The following GM2 SPA.LVO.100(c) is inserted:

GM2 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONS WITH OPERATIONAL CREDITS — SPECIAL AUTHORISATION CATEGORY I (SA CAT I) OPERATIONS

SA CAT I is an operational credit that exploits a navigation solution with superior performance to that required for standard CAT I by extending the instrument segment of CAT I approach operations. This navigation solution may be an ILS installation with the necessary performance coupled to a suitably certified autoland system or a HUD or equivalent display system or SVGS. The extended instrument segment means that the DH can be reduced from the standard minimum of 200 down to 150ft. The lower DH allows a corresponding reduction in the RVR required for the approach.

SA CAT I is not a separate approach classification; it is an operational credit applied to a CAT I operation.

The following GM3 SPA.LVO.100(c) is inserted:

GM3 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONS WITH OPERATIONAL CREDITS — SPECIAL AUTHORISATION CATEGORY II (SA CAT II) OPERATIONS

SA CAT II is an operational credit that applies to the visual segment of an approach conducted where aerodrome, runway and approach lighting systems do not meet the usual requirements for a CAT II precision lighting system. SA CAT II exploits the performance of a suitably certified HUDLS or autoland system. The DH will be the same as for standard CAT II, and the required RVR will depend on the class of light facility installed.

SA CAT II is not a separate approach classification; it is an operational credit applied to a CAT II operation usually in a CAT I runway.

The following GM4 SPA.LVO.100(c) is inserted:

GM4 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONS WITH OPERATIONAL CREDITS — EFVS OPERATIONS

(a) EFVS operations, if approved, exploit the improved visibility provided by the EFVS to allow an operational credit applied to the visual segment of an instrument approach. An EFVS cannot be used to extend the instrument segment of an approach and thus the DH for operation with an EFVS is always the same as for the same approach conducted without an operational credit.

(b) EFVS operations require specific approval from the CAA in accordance with Part-SPA. However, other EFVS operations may be conducted by operators and without a specific approval if specifically covered in accordance with Part-CAT, Part-NCC or Part-SPO (e.g. 'EFVS 200').

(c) Equipment for EFVS operations

(1) In order to conduct EFVS operations, a certified EFVS is used. An EFVS is an enhanced vision system (EVS) that also incorporates a flight guidance system and displays the image on a HUD or an equivalent display. The flight guidance system will incorporate aircraft flight information and flight symbology.

(2) For operations for which a minimum flight crew of more than one pilot is required, the aircraft will also be equipped with a suitable display of EFVS sensory imagery for the pilot monitoring the progress of the approach.

(3) Legacy systems may be certified as 'EVS with an operational credit'. Such a system may be considered an EFVS used for approach (EFVS-A).

(4) Aircraft holding a type certificate issued by a third country may be certified for operations equivalent to EFVS operations. Specific approval for an operational credit for EFVS operations will be available only if the operator can demonstrate that the equipment meets all the requirements for certification in accordance with CS-AWO.

(5) For approaches for which natural visual reference is not required prior to touchdown, the EFVS (EFVS used for landing (EFVS-L)) will additionally display:

(i) flare prompt or flare guidance information; and

(ii) height AGL.

(d) Suitable approach procedures

(1) For types of approach operation, refer to AMC1 SPA.LVO.110 'Additional verification of the suitability of runways for EFVS operations'.

EFVS operations may be used for 3D approach operations. These may include operations based on non-precision approach (NPA) procedures, approach procedures with vertical guidance and PA procedures including approach operations requiring specific approvals, provided that the operator holds the necessary approvals.

An NPA procedure flown using vertical guidance from computer-generated navigation data from ground-based, space-based, self-contained navigation aids, or a combination of these may be considered a 3D instrument approach operation, so EFVSs may be used for NPA procedures provided that vertical guidance is available to the pilot.

(2) Offset approaches

The extent to which EFVSs can be used for offset approaches will depend on the FOV of the specific system. Where an EFVS has been demonstrated to be usable with a final approach track offset more than 3 degrees from the runway centre line, this will be stated in the AFM.

Instrument approach procedures (IAPs) may have the final approach course significantly offset from the centre line of the runway and still be considered 'straight-in approaches'. Many approach procedures with an offset final approach course are constructed so that the final approach course crosses the runway centre line extended well out from the runway. Depending on the construction of a particular procedure, the wind conditions and the available FOV of a specific EFVS installation, the required visual references may not come into view before the aircraft reaches the DH.

(3) Circling approaches

EFVSs incorporate a HUD or an equivalent system so that the EFVS image is visible in the pilot's forward external FOV. Circling operations require the pilot to maintain visual references which may not be directly ahead of the aircraft and may not be aligned with the current flight path. EFVSs cannot therefore be used in place of natural visual reference for circling approaches.

(e) For aerodrome operating minima for EFVS operations, refer to AMC3 SPA.LVO.100(c).

The performance of EFVSs depends on the technology used and weather conditions encountered. The minimum RVR for an approach is based on the specific capabilities of the installed equipment in the expected weather conditions, so the RVR for a particular operation is determined according to criteria stipulated in the AFM.

Table 10 has been provided to allow calculation of an appropriate RVR for aircraft where the AFM does not contain criteria to determine the minimum usable RVR. This table has been developed after an operational evaluation of two different EVSs both using infrared sensors, along with data and support provided by the Federal Aviation Administration (FAA). Approaches were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. Table 10 contains conservative figures to cater for the expected performance of infrared sensors in the variety of conditions that might be encountered.

(f) The conditions for commencement and continuation of the approach are in accordance with CAT.OP.MPA.305, NCC.OP.230, NCO.OP.210 and SPO.OP.215 as applicable.

Pilots conducting EFVS operations may commence an approach and continue that approach below 1 000ft above the aerodrome or into the final approach segment (FAS) if:

(1) the reported RVR or converted meteorological visibility (CMV) is equal to or greater than the lowest RVR minima determined; and

(2) all the conditions for conducting EFVS operations are met.

If any equipment required for EFVS operations is unserviceable or unavailable, then the conditions for conducting EFVS operations would not be satisfied, and the approach cannot be commenced. Operators may develop procedures for flight crew to follow in the event of unserviceability arising after the aircraft descends below 1 000ft above the aerodrome or into the FAS. Such procedures should ensure that the approach is not continued unless the RVR is sufficient for the type of approach that can be conducted with equipment that remains available. In the event of failure of the equipment required for EFVS operations, a go-around would be executed unless the RVR reported prior to commencement of the approach was sufficient for the approach to be flown without the use of EFVS in lieu of natural vision.

(g) EFVS image requirements at the DA/H are specified in AMC7 SPA.LVO.105(c).

The requirements for features to be identifiable on the EFVS image in order to continue approach below DH are more stringent than the visual reference requirements for the same approach flown without EFVS. This is necessary because the EFVS might not display the colour of lights used to identify specific portions of the runway and might not consistently display the runway markings. Any visual approach path indicator using colour-coded lights may be unusable.

(h) Obstacle clearance in the visual segment

The 'visual segment' is the portion of the approach between the DH and the runway threshold. In the case of EFVS operations, this part of the approach may be flown using the EFVS image as the primary reference and there may be obstacles that are not always identifiable on an EFVS image. Approach procedures designed in accordance with PANS-OPS criteria is required to ensure that the visual segment is protected for obstacles by the visual segment surface (VSS) that extends from 60 m before the threshold to the location of the OCH. Procedures not designed in accordance with PANS-OPS may have not been assessed for terrain or obstacle clearance below the OCH-and may not provide a clear vertical path to the runway at the normally expected descent angle. SA CAT I and CAT II/III runways subject to EU aerodrome regulations are required to provide an OFZ, which offers protection from obstacles in the visual segment. Standard CAT I runways may also provide an OFZ and if not, the lack of an OFZ shall be indicated, according to ICAO Annex 4, normally on the approach chart.

(i) Visual reference requirements at minimum height to continue approach without natural visual reference

For operations other than EFVS to touchdown, natural visual reference is required before landing. The objective of this requirement is to ensure that the pilot will have sufficient visual reference to land. The visual reference should be the same as the one required for the same approach flown without the use of EFVS. The specific height at which this is required will depend on the capability of the aircraft installation and will be specified in the AFM. For aircraft certified for EFVS operations but where no such height is specified in the AFM, natural visual reference is required by a height of 100ft above the threshold elevation.

Specific EFVSs may have additional requirements that must be fulfilled at this height to allow the approach to continue, such as a requirement to check that the elements of the EFVS display remain correctly aligned and scaled to the external view. Any such requirements will be detailed in the AFM.

(j) Use of EFVS to touchdown

In order for the use of EFVS to touchdown to be approved, the EFVS will provide flare prompt or flare guidance (EFVS-L). This mitigates the fact that a 2D image and a narrow FOV displayed by the EFVS may cause erroneous perceptions of depth or height. The EFVS will also display height above the runway by the use of a radio altimeter or other device capable of providing equivalent performance. Unless the operator has verified that the terrain ahead of the threshold and landing system assessment area (LSAA) slope is suitable for the use of a radio altimeter, such a system should not be relied upon to provide accurate information about the height of the aircraft above the runway threshold until the aircraft is over the runway surface.

(k) Go-around

A go-around will be promptly executed if the required visual references are not maintained on the EFVS image at any time after the aircraft has descended below the DA/H or if the required visual references are not distinctly visible and identifiable using natural vision after the aircraft is below the minimum height to continue approach without natural visual reference (if applicable). It is considered more likely that an operation with EFVS could result in initiation of a go-around below the DA/H than the equivalent approach flown without EFVS. According to AMC1 SPA.LVO.105(f), operators involved in EFVS operations should keep records of the number of successful and unsuccessful approaches using EFVS in order to detect and act on any undesirable trends.

For category II and III PA procedures designed in accordance with PANS-OPS criteria, obstacle protection is provided for a go-around initiated below the DH (balked landing) by means of an obstacle free zone (OFZ). An OFZ may also be provided for category I PA procedures. Where an OFZ is not provided for a category I PA, this may be indicated on the approach chart. NPA procedures and approach procedures with vertical guidance provide obstacle clearance for the missed approach based on the assumption that the missed approach is executed at or above the DH. The DH should be located at or before the MAPt.

The following GM5 SPA.LVO.100(c) is inserted:

GM5 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONS WITH OPERATIONAL CREDITS — COMBINED VISION SYSTEMS

A combined vision system (CVS) consisting of an EFVS and an SVS can be approved for EFVS operationsif it meets all the certification requirements for an EFVS.

The following GM6 SPA.LVO.100(c) is inserted:

GM6 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONS WITH OPERATIONAL CREDITS — HELICOPTER SPECIAL AUTHORISATION CATEGORY I (HELI SA CAT I) OPERATIONS

HELI SA CAT I is an operational credit that exploits a navigation solution with superior performance to that required for standard CAT I by extending the instrument segment of CAT I approach operations. This navigation solution may be an ILS installation with the necessary performance coupled to a suitably certified 3- or 4-axis autopilot capable of handling low speeds, together with the superior outside visibility of the helicopter on the visual segment, and the go-around performance of a helicopter. The better outside visibility and the lower speed allows a reduction in the RVR required for the approach, for a given DH. With a 4-axis autopilot and auto-level-off capability, the DH can also be reduced from the standard minimum of 200ft down to 150 or 130ft.

HELI SA CAT I is not a separate approach classification; it is an operational credit applied to a CAT I operation.

GM1 SPA.LVO.100(f) is deleted:

~~GM1 SPA.LVO.100(f) Low visibility operations~~

~~**OPERATIONS UTILISING EVS**~~

~~(a) Introduction~~

~~(1) Enhanced vision systems use sensing technology to improve a pilot's ability to detect objects, such as runway lights or terrain, which may otherwise not be visible. The image produced from the sensor and/or image processor can be displayed to the pilot in a number of ways including use of a HUD. The systems can be used in all phases of flight and can improve situational awareness. In particular, infra-red systems can display terrain during operations at night, improve situational awareness during night and low-visibility taxiing, and may allow earlier acquisition of visual references during instrument approaches.~~

~~(b) Background to EVS provisions~~

~~(1) The provisions for EVS were developed after an operational evaluation of two different EVS systems, along with data and support provided by the FAA. Approaches using EVS were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. The infra-red EVS performance can vary depending on the weather conditions encountered. Therefore, the provisions take a conservative approach to cater for the wide variety of conditions which may be encountered. It may be necessary to amend the provisions in the future to take account of greater operational experience.~~

~~(2) Provisions for the use of EVS during take-off have not been developed. The systems evaluated did not perform well when the RVR was below 300 m. There may be some benefit for use of EVS during take-off with greater visibility and reduced light; however, such operations would need to be evaluated.~~

(3) Provisions have been developed to cover use of infra-red systems only. Other sensing technologies are not intended to be excluded; however, their use will need to be evaluated to determine the appropriateness of this, or any other provision. During the development, it was envisaged what minimum equipment should be fitted to the aircraft. Given the present state of technological development, it is considered that a HUD is an essential element of the EVS equipment.

(4) In order to avoid the need for tailored charts for approaches utilising EVS, it is envisaged that the operator will use AMC6 SPA.LVO.110 Table 6 Operations utilising EVS RVR/CMV reduction vs. normal RVR/CMV to determine the applicable RVR at the commencement of the approach.

(c) Additional operational considerations

(1) EVS equipment should have:

(i) 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 and flight path angle reference cue and the EVS imagery);

(ii) a head-down view of the EVS image, or other means of displaying the EVS-derived information easily to the pilot monitoring the progress of the approach; and

(iii) means to ensure that the pilot monitoring is kept in the 'loop' and crew resource management (CRM) does not break down.

AMC1 SPA.LVO.105 is deleted:

AMC1 SPA.LVO.105 LVO approval

OPERATIONAL DEMONSTRATION – AEROPLANES

(a) General

(1) The purpose of the operational demonstration should be to determine or validate the 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 CAT II/III programme being approved.

(i) At least 30 approaches and landings should be accomplished in operations using the CAT 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 should be accomplished.

(ii) 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 of aircraft, the operator should show that the various variants have satisfactory performance, but need not conduct a full operational demonstration for each variant. The number of approaches and landings may be based on credit given for the experience gained by another operator, using the same aeroplane type or variant and procedures.

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

(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 CAA for evaluation.

(3) Unsatisfactory approaches and/or automatic landings should be documented and analysed.

(b) Demonstrations

(1) Demonstrations may be conducted in line operations or any other flight where the operator's procedures are being used.

(2) 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. 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. Sufficient information should be collected to determine the cause of any unsatisfactory performance (e.g. sensitive area was not protected).

(3) 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.

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

(c) Data collection for operational demonstrations

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

(2) The data should, as a minimum, include the following information:

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

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

(iii) 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.

(d) Data analysis

Unsuccessful approaches due to the following factors may be excluded from the analysis:

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

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

(3) ~~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.~~

AMC2 SPA.LVO.105 is deleted:

~~AMC2 SPA.LVO.105 LVO approval~~

~~OPERATIONAL DEMONSTRATION – HELICOPTERS~~

(a) ~~The operator should comply with the provisions prescribed below when introducing into CAT II or III service a helicopter type that is new to the EU.~~

(1) ~~Operational reliability~~

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

(2) ~~Criteria for a successful approach~~

~~An approach is regarded as successful if:~~

(i) ~~the criteria are as specified in CS-AWO or equivalent are met; and~~

(ii) ~~no relevant helicopter system failure occurs.~~

~~For helicopter types already used for CAT II or III operations in another State, the in-service proving programme in (e) should be used instead.~~

(b) ~~Data collection during airborne system demonstration - general~~

(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 (c) and (d) below.~~

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

(c) ~~Data collection during airborne system demonstration – operations with DH not less than 50 ft~~

(1) ~~For operations with DH not less than 50 ft, data should be recorded and evaluated by the operator and evaluated by the CAA when necessary.~~

(2) ~~It is sufficient for the following data to be recorded by the flight crew:~~

(i) ~~FATO and runway used;~~

(ii) ~~weather conditions;~~

(iii) ~~time;~~

(iv) ~~reason for failure leading to an aborted approach;~~

(v) ~~adequacy of speed control;~~

(vi) ~~trim at time of automatic flight control system disengagement;~~

(vii) ~~compatibility of automatic flight control system, flight director and raw data;~~

(viii) ~~an indication of the position of the helicopter relative to the ILS, MLS centre line~~

when descending through 30 m (100 ft); and

(ix) touchdown position.

(3) 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.

(d) Data collection during airborne system demonstration – operations with DH less than 50 ft or no DH

(1) 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:

(i) 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

(ii) sink rate at touchdown.

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

(e) In-service proving

The operator fulfilling the provisions of (f) above should be deemed to have met the in-service proving contained in this subparagraph.

(1) 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.

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

(3) 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 notconduct a full operational demonstration for each variant.

AMC3 SPA.LVO.105 is deleted:

AMC3 SPA.LVO.105 LVO approval

CONTINUOUS MONITORING – ALL AIRCRAFT

(a) After obtaining the initial approval, the operations should be continuously monitored by the operator to detect any undesirable trends before they become hazardous. Flight crew reports may be used to achieve this.

(b) The following information should be retained for a period of 12 months:

(1) the total number of approaches, by aircraft type, where the airborne CAT II or III equipment was utilised to make satisfactory, actual or practice, approaches to the applicable CAT II or III minima; and

(2) ~~reports of unsatisfactory approaches and/or automatic landings, by aerodrome and aircraft registration, in the following categories:~~

(i) ~~airborne equipment faults;~~

(ii) ~~ground facility difficulties;~~

(iii) ~~missed approaches because of ATC instructions; or~~

(iv) ~~other reasons.~~

(c) ~~The operator should establish a procedure to monitor the performance of the automatic landing system or HUDLS to touchdown performance, as appropriate, of each aircraft.~~

AMC4 SPA.LVO.105 is deleted:

~~AMC4 SPA.LVO.105 LVO approval~~

~~TRANSITIONAL PERIODS FOR CAT II AND CAT III OPERATIONS~~

(a) ~~Operators with no previous CAT II or CAT III experience~~

(1) ~~The operator without previous CAT II or III operational experience, applying for a CAT II or CAT IIIA operational approval, should demonstrate to the CAA that it has gained a minimum experience of 6 months of CAT I operations on the aircraft type.~~

(2) ~~The operator applying for a CAT IIIB operational approval should demonstrate to the CAA that it has already completed 6 months of CAT II or IIIA operations on the aircraft type.~~

(b) ~~Operators with previous CAT II or III experience~~

(1) ~~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 CAA that it has maintained the experience previously gained on the aircraft type.~~

(2) ~~The operator approved for CAT II or III operations using auto-coupled approach procedures, with or without auto-land, and subsequently introducing manually flown CAT II or III operations using a HUDLS should provide the operational demonstrations set out in **AMC1 SPA.LVO.105** and **AMC2 SPA.LVO.105** as if it would be a new applicant for a CAT II or CAT III approval.~~

AMC5 SPA.LVO.105 is deleted:

~~AMC5 SPA.LVO.105 LVO approval~~

~~MAINTENANCE OF CAT II, CAT III AND LVTO EQUIPMENT~~

~~Maintenance instructions for the on-board guidance systems should be established by the operator, in liaison with the manufacturer, and included in the operator's aircraft maintenance programme in accordance with **Annex I** to Regulation (EU) No 1321/2014.~~

AMC6 SPA.LVO.105 is deleted:

~~AMC6 SPA.LVO.105 LVO approval~~

~~ELIGIBLE AERODROMES AND RUNWAYS~~

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

(b) For runways with irregular pre-threshold terrain or other foreseeable or known deficiencies, each aircraft type/runway combination should be verified by operations in CAT I or better conditions, prior to commencing LTS CAT I, CAT II, OTS CAT II or CAT III operations.

(c) If the operator has different variants of the same type of aircraft in accordance with (d), 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 (d), the operator should show that the variants have satisfactory operational performance, but need not conduct a full operational demonstration for each variant/runway combination.

(d) For the purpose of this AMC, an aircraft type or variant of an aircraft type should be deemed to be the same type/variant of aircraft if that type/variant has the same or similar:

(1) level of technology, including the following:

(i) flight control/guidance system (FGS) and associated displays and controls;

(ii) FMS and level of integration with the FGS; and

(iii) use of HUDLS;

(2) operational procedures, including:

(i) alert height;

(ii) manual landing /automatic landing;

(iii) no DH operations; and

(iv) use of HUD/HUDLS in hybrid operations;

(3) handling characteristics, including:

(i) manual landing from automatic or HUDLS guided approach;

(ii) manual missed approach procedure from automatic approach; and

(iii) automatic/manual rollout.

(e) Operators using the same aircraft type/class or variant of a type in accordance with (d) above may take credit from each other's experience and records in complying with this subparagraph.

(f) Where an approval is sought for OTS CAT II, the same provisions as set out for CAT II should be applied.

The following AMC1 SPA.LVO.105(a) is inserted:

AMC1 SPA.LVO.105(a) Specific approval criteria

AIRCRAFT CERTIFICATION FOR THE INTENDED OPERATIONS

(a) Aircraft used for LVTO in an RVR of less than 125 m should be equipped with a system certified for the purpose.

(b) Aircraft used for low-visibility approach operations should be equipped in accordance with the applicable airworthiness requirements and certified as follows:

(1) For CAT II operations, the aircraft should be certified for CAT II operations.

(2) For CAT III operations, the aircraft should be certified for CAT III operations.

(3) For SA CAT I, the aircraft should be certified for SA CAT I operations.

(4) For SA CAT II, the aircraft should be certified for CAT II operations and be equipped with HUDLS or fail-passive autoland or better.

(5) For EFVS operations, the aircraft should be equipped with a certified EFVS-A or EFVS-L.

The following GM1 SPA.LVO.105(a) is inserted:

GM1 SPA.LVO.105(a) Specific approval criteria

AIRCRAFT CERTIFICATION — EQUIPMENT ELIGIBLE FOR LOW VISIBILITY TAKE-OFF IN AN RVR LESS THAN 125M

Systems that are used to qualify for take-off in an RVR less than 125m typically allow the pilot to use the external visual cues as well as instrumented guidance to track the runway centre line. The kind of systems in use today include paravisual display (PVD) and HUD. It is expected that EFVSs will be certified for take-off guidance in the future. Where the PVD or HUD uses an ILS localiser signal as reference, the ILS sensitive area must be protected by the LVPs at the aerodrome.

The following AMC1 SPA.LVO.105(c) is inserted:

AMC1 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES FOR LVOs

Prior to commencing an LVO, the pilot-in-command/commander should be satisfied that:

(a) the status of visual and non-visual facilities is as required;

(b) if LVPs are required for such operations, LVPs are in effect; and

(c) the flight crew members are appropriately qualified.

The following AMC2 SPA.LVO.105(c) is inserted:

AMC2 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — GENERAL

(a) Operating procedures should be established for all types of LVOs and operations with operational credits for which an operator is seeking approval. The operating procedures should:

(1) be consistent with the AFM;

(2) be appropriate to the technology and equipment to be used;

(3) specify the duties and responsibilities of each flight crew member in each relevant phase of flight;

(4) ensure that flight crew workload is managed to facilitate effective decision-making and monitoring of the aircraft; and

(5) minimise, as much as practical, the deviation from normal procedures used for routine operations (non-LVOs).

(b) Operating procedures should include:

(1) the required checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;

(2) the correct seating and eye position;

(3) determination of aerodrome operating minima;

(4) the increment to be added to minima for use by pilots-in-command/commanders who are new to the aircraft type, if applicable;

(5) the effect on aerodrome operating minima of temporarily failed or downgraded ground equipment;

(6) the effect on aerodrome operating minima of the failure or change of the status of any aircraft systems;

(7) when the LVPs at the aerodrome are required. LVPs are required:

(i) for low-visibility flight approach operations;

(ii) for LVTOs with RVR less than 400 m.

If an operator selects an aerodrome with equivalent procedures, where the term 'LVPs' is not used (e.g. regional procedures), the operator should verify that suitable procedures are established to ensure an equivalent level of safety to that achieved at approved aerodromes. This situation should be clearly noted in the operations manual or procedures manual, including guidance to the flight crew on how to determine that the suitable procedures are in effect at the time of an actual operation. Note: the AFM may state that some elements of LVPs are not required and therefore the equivalent level of safety may be established on that basis;

(8) a requirement for an 'approaching minima' call-out to prevent inadvertent descent below the DA/H;

(9) the requirement for height call-outs below 200 ft to be based on the use of a radio altimeter or other device capable of providing equivalent performance, if applicable;

(10) the required visual references;

(11) the action to be taken in the event of loss of the required visual references; and

(12) the maximum allowable flight path deviations and action to be taken in the event that such deviations occur.

(c) Operators required to comply with the requirements of Annex III (Part-ORO) to this Regulation should include operating procedures in the operations manual as required by ORO.MLR.100. The operators to which Part-ORO does not apply should include the operating procedures in a 'procedures manual'.

The following AMC3 SPA.LVO.105(c) is inserted:

AMC3 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — CAT II

For CAT II operations, the following should apply:

(a) The flight crew should consist of at least two pilots.

(b) The approach should be flown using a certified system as identified in the AFM.

(c) If the approach is flown using autopilot, for a manual landing the autopilot should remain engaged until after the pilot has achieved visual reference.

(d) All height call-outs below 200ft above the runway threshold elevation should be determined by the use of a radio altimeter or other device capable of providing equivalent performance.

(e) The DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance, if so determined by the aircraft certification process.

(f) At DH, the following visual references should be distinctly visible and identifiable to the pilot:

(1) a segment of at least three consecutive lights, which are the centre line of the approach lights or TDZ lights or runway centre line lights or edge lights or a combination of these; and

(2) a visual reference that should include a lateral element of the ground pattern, such as an approach lighting crossbar, or the landing threshold, or a barrette of the TDZ lighting unless the operation is conducted using a HUD or an equivalent system to touchdown.

The following AMC4 SPA.LVO.105(c) is inserted:

AMC4 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — CAT III

For CAT III operations, the following should apply:

(a) The flight crew should consist of at least two pilots.

(b) The approach should be flown using a certified system as identified in the AFM.

(c) All height call-outs below 200ft above the runway threshold elevation should be determined by the use of a radio altimeter or other device capable of providing equivalent performance.

(d) For operations in which a DH is used, the DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance, if so determined by the aircraft certification process.

(e) At DH, the following visual references should be distinctly visible and identifiable to the pilot:

(1) for operations conducted either with fail-passive flight control systems or with the use of an approved HUD or equivalent display system: a segment of at least three consecutive lights, which are the centre line of the approach lights, or TDZ lights, or runway centre line lights, or runway edge lights, or a combination of these; and

(2) for operations conducted either with fail-operational flight control systems or with a fail-operational hybrid landing system using a DH: at least one centre line light to be attained and maintained by the pilot.

(f) For operations with no DH, there is no specification for visual reference with the runway prior to touchdown.

The following AMC5 SPA.LVO.105(c) is inserted:

AMC5 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — SA CAT I

For SA CAT I operations, the following should apply:

(a) The approach should be flown using a certified system as identified in the AFM.

(b) All height call-outs below 200ft above the runway threshold elevation should be determined by the use of a radio altimeter or other device capable of providing equivalent performance.

(c) The DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance, if so determined by the aircraft certification process.

(d) At DH the following visual references should be visible to the pilot:

(1) a segment of at least three consecutive lights, which are the centre line of the approach lights, or TDZ lights, or runway centre line lights, or runway edge lights, or a combination of these; and

(2) a visual reference that should include a lateral element of the ground pattern, such as an approach lighting crossbar, or the landing threshold, or a barrette of the TDZ lighting unless the operation is conducted utilising an approved HUD or an equivalent system usable down to 120ft above the runway threshold.

The following AMC6 SPA.LVO.105(c) is inserted:

AMC6 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — SA CAT II

For SA CAT II operations, the following should apply:

(a) The flight crew should consist of at least two pilots.

(b) The approach should be flown using a certified HUDLS or autoland system as identified in the AFM.

(c) All height call-outs below 200ft above the runway threshold elevation should be determined by the use of a radio altimeter or other device capable of providing equivalent performance.

(d) The DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance, if so determined by the aircraft certification process.

(e) At DH the visual references should be distinctly visible and identifiable to the pilot:

(1) a segment of at least three consecutive lights, which are the centre line of the approach lights or TDZ lights, or runway centre line lights, or runway edge lights or a combination of these;

(2) a visual reference that should include a lateral element of the ground pattern, such as an approach lighting crossbar, or the landing threshold, or a barrette of the TDZ lighting.

The following AMC7 SPA.LVO.105(c) is inserted:

AMC7 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — EFVS OPERATIONS TO A RUNWAY

For EFVS operations to a runway, the following should apply:

(a) The approach should be flown using a certified EFVS-A or EFVS-L as identified in the AFM.

(b) The pilot flying should use the EFVS throughout the approach.

(c) In multi-pilot operations, the pilot monitoring should monitor the EFVS-derived information.

(d) The approach between the final approach fix (FAF) and the DA/H should be flown using vertical flight path guidance mode (e.g. flight director)

(e) The approach may be continued below the DA/H provided that the pilot can identify on the EFVS image either:

(1) the approach light system; or

(2) both of the following:

(i) the runway threshold identified by the beginning of the runway landing surface, the threshold lights or the runway end identifier lights; and

(ii) the TDZ identified by the TDZ lights, the TDZ runway markings or the runway edge lights.

(f) Unless the aircraft is equipped with a certified EFVS-L, a missed approach should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by the following height above the threshold:

(1) the height below which an approach should not be continued if natural visual reference is not acquired by the crew as stated in the AFM; or

(2) if the AFM does not specify such a height, 100ft.

GM1 SPA.LVO.100(e) is replaced by the following

GM1 SPA.LVO.105(c) ~~100(e) Low visibility operations~~ Specific approval criteria

FLIGHT CREW ACTIONS IN CASE OF AUTOPILOT FAILURE AT OR BELOW DH IN FAIL-PASSIVE CAT III OPERATIONS

For operations to actual RVR values less than 300 m, a missed approach procedure is assumed in the event of an autopilot failure at or below DH. This means that a missed approach procedure is the normal action. However, the wording recognises that there may be circumstances where the safest action is to continue the landing. Such circumstances include the height at which the failure occurs, the actual visual references, and other malfunctions. This would typically apply to the late stages of the flare. In conclusion, it is not forbidden to continue the approach and complete the landing when the pilot-in-command/commander determines that this is the safest course of action. The operator's policy and the operational instructions should reflect this information.

The following AMC1 SPA.LVO.105(g) is inserted:

AMC1 SPA.LVO.105(g) Specific approval criteria

SAFETY ASSESSMENT — MONITORING, DATA COLLECTION AND PERFORMANCE INDICATORS FOR APPROACH OPERATIONS

(a) The operator should monitor LVOs and operations with operational credits in order to validate the effectiveness of the applicable aircraft flight guidance systems, training, flight crew procedures, and aircraft maintenance programme, and to identify hazards.

(b) Data should be collected whenever an LVO or an operation with an operational credit is attempted regardless of whether the approach is abandoned, is unsatisfactory, or is concluded successfully. The data should include records of the following:

(1) occasions when it was not possible to commence an approach due to deficiencies or unserviceabilities of related airborne equipment;

(2) occasions when approaches were discontinued, including the reasons for discontinuing the approach and the height above the runway at which the approach was discontinued;

(3) occasions when system abnormalities required pilot intervention to ensure a continued approach or safe landing;

(4) landing performance, whether or not the aircraft landed satisfactorily within the desired touchdown area with acceptable lateral velocity or cross-track error. 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 recorded.

(c) Data about LVOs should be collected by means of the operator's flight data monitoring programme supplemented by other means including reports submitted by flight crew. Operators that do not have a flight data monitoring programme should use reports submitted by flight crew as the primary means of gathering data.

(d) Performance indicators should include the following:

(1) the rate of unsuccessful low-visibility approaches, i.e. the number of attempted approaches terminating in discontinued approaches, approaches where pilot intervention was required to ensure a continued approach or safe landing or where landing performance was unsatisfactory, compared to the number of low-visibility approaches attempted;

(2) measures of performance of the airborne equipment for low-visibility approaches or operations with operational credits;

(3) safety performance indicators related to other specific risks associated with LVOs.

(e) The following information should be retained for at least 5 years:

(1) the total number of low-visibility approaches or operations with an operational approval attempted or completed, including practice approaches, by aircraft type; and

(2) reports of unsatisfactory approaches and/or landings, by runway and aircraft registration, in the following categories:

(i) airborne equipment faults;

(ii) ground facility difficulties;

(iii) missed approaches because of air traffic control (ATC) instructions; or

(iv) other reasons.

The following AMC2 SPA.LVO.105(g) is inserted:

AMC2 SPA.LVO.105(g) Specific approval criteria

SAFETY ASSESSMENT PRIOR TO OBTAINING AN APPROVAL

(a) Prior to commencing LVOs or operations with operational credits, an operator should demonstrate to the CAA that such operations will achieve an acceptable level of safety. This requires the operator to gather data from operations using the relevant systems and procedures and conduct safety assessments taking that data into account.

(b) The operator applying for the approval of low-visibility approach operations should determine the minimum number of approaches required to gather sufficient data to demonstrate an acceptable level of safety and the time period over which such data should be gathered.

(c) If an operator is applying for more than one LVO approval or an approval for operation with operational credits for a particular aircraft type, then data gathered from operations using the systems and procedures designed for one classification of operations or operation with operational credits may be used to support the application for another classification of operations or operation with operational credits provided the following elements are similar:

(1) type of technology, including:

(i) flight control/guidance system (FGS) and associated displays and controls;

(ii) flight management system (FMS) and level of integration with the FGS;

(iii) use of HUD or an equivalent display system; and

(iv) use of EFVS;

(2) operational procedures, including:

(i) alert height;

(ii) manual landing/automatic landing;

(iii) no DH operations;

(iv) use of HUD or an equivalent display system in hybrid operations; and

(v) use of EFVS to touchdown; and

(3) handling characteristics, including:

(i) manual landing from automatic or HUD or an equivalent display system guided approach;

(ii) manual missed approach procedure from automatic approach; and

(iii) automatic/manual roll-out.

(d) An operator holding an approval for low-visibility approach operations or operations with operational credits may use data gathered from approaches conducted using one aircraft type to support an application for approval for a different aircraft type or variants provided the following elements are similar:

(1) type of technology, including the following:

(i) FGS and associated displays and controls;

(ii) FMS and level of integration with the FGS;

(iii) use of HUD or an equivalent display system; and

(iv) use of EFVS;

(2) operational procedures, including:

(i) alert height;

(ii) manual landing/automatic landing;

(iii) no DH operations;

(iv) use of HUD or an equivalent display system in hybrid operations; and

(v) use of EFVS to touchdown; and

(3) handling characteristics, including:

(i) manual landing from automatic or HUD or an equivalent display system guided approach;

(ii) manual missed approach procedure from automatic approach; and

(iii) automatic/manual roll-out.

GM1 SPA.LVO.105 is replaced by the following:

GM1 SPA.LVO.105(g) ~~LVO approval~~ Specific approval criteria

SPECIFIC APPROVAL CRITERIA ~~-~~ ~~FOR A~~ SUCCESSFUL ~~CAT II, OTS CAT II, CAT III~~ APPROACH AND AUTOMATIC LANDING

(a) The purpose of this GM is to provide operators with supplemental information regarding the criteria for a successful approach and landing ~~to facilitate fulfilling the requirements prescribed~~

in SPA.LVO.105.

(b) An approach may be considered to be successful if:

(1) from 500 ft to start of flare:

(i) speed is maintained as specified in AMC-AWO 231, paragraph 2 'Speed Control'; and within +/- 5 kt of the intended speed, disregarding rapid fluctuations due to turbulence;

(ii) no relevant system failure occurs; and

(2) from 300ft to DH:

(i) no excess deviation occurs; and

(ii) no centralised warning gives a missed approach procedure command (if installed).

(c) An automatic A landing may be considered to be successful if:

(1) no relevant system failure occurs;

(2) no flare failure occurs;

(3) no de-crab failure occurs (if installed);

(4) longitudinal touchdown is beyond a point on the runway 60 150m after the threshold and before the end of the touchdown zone (TDZ) light (900 750m from the threshold);

(5) lateral touchdown with the outboard landing gear is not outside the TDZ touchdown zone light edge;

(6) sink rate is not excessive;

(7) bank angle does not exceed a bank angle limit; and

(8) no rollout failure or deviation (if installed) occurs.

(d) More details can be found in CS-AWO 131, CS-AWO 231 and AMC-AWO 231. CS AWO.A.ALS.106, CS AWO.B.CATII.113 and AMC AWO.B.CATII.113.

The following GM2 SPA.LVO.105(g) is inserted:

GM2 SPA.LVO.105(g) Specific approval criteria

SAFETY PERFORMANCE MONITORING

(a) Data gathering for safety performance monitoring of LVOs and operations with operational credits will need to include sufficient information for the operator to identify hazards and assess the risks associated with LVOs and operations with operational credits.

(b) The following data relating to LVOs and operations with operational credits may be gathered via flight crew reports, flight data monitoring or other means, as appropriate:

(1) date and time;

(2) aircraft details (type and registration);

(3) airport, approach procedure, final approach and take-off area (FATO) and/or runway used;

(4) the type of LVO or operation with operational credits attempted or completed;

(5) weather conditions including wind, reported RVR and natural phenomena that restrict visibility;

(6) the reason for a discontinued approach (if applicable);

(7) details of any pilot intervention to ensure a continued approach or safe landing;

(8) adequacy of speed control;

(9) trim at time of automatic flight control system disengagement (if applicable);

(10) compatibility of automatic flight control system, flight director and raw data;

(11) an indication of the position of the aircraft relative to the centre line when descending through to 100ft;

(12) touchdown position relative to the TDZ;

(13) an assessment of the sink rate, lateral velocity and bank angle at touchdown;

(14) the nature of any problems encountered by the crew in relation to operating procedures or training; and

(15) any human factors issues that arose in relation to the operation.

(c) Where data is gathered as part of the operator's flight data monitoring programme, procedures should be established to ensure that information that is only available directly from the flight crew or other sources (e.g. weather information) is captured.

(d) In order to assess the risks associated with LVOs and operations with operational credits, operators may consider hazards with the potential to result in the following unacceptable safety outcomes:

(1) loss of control in flight;

(2) runway overrun or excursion;

(3) controlled flight into terrain;

(4) runway incursion and ground collision; and

(5) airborne conflict.

(e) Operators' safety control processes will ensure that LVOs and operations with operational credits:

(1) meet the safety objectives and performance standards established in the operator's safety policy;

(2) achieve at least the same level of safety as operations other than LVOs and operations without operational credits; and

(3) have a continuously improving safety performance.

(f) Two methods to determine the rate of unsuccessful low-visibility approaches are described below:

(1) Fail/pass method (binary): the rate of unsuccessful low-visibility approaches determined in accordance with GM1 SPA.LVO.105(g) should not exceed 5 %. If the unsuccessful operations appear to occur on a given aircraft, aircraft series or runway, specific mitigation measures need to be established and a separate specific rate may need to be calculated and monitored. Note: the term 'aircraft series' is explained in GM5 SPA.LVO.110. Operators may choose to apply a lower rate than 5 %.

(2) Continuous method: this method may be selected by operators with a flight data monitoring programme. This methodology is more refined and allows identifying undesirable trends earlier and possibly before they become severe. This method applies an event monitoring methodology in which the deviations from the nominal performance are categorised according to their severity (severity index). For each event (criterion), a level of deviation may be defined as follows:

(i) Low (‘green’): the deviation is small and within the limits of nominal behaviour. No action is required.

(ii) Medium (‘yellow’): the deviation is above the criteria for low (‘green’) and below the criteria for high (‘red’). No corrective action should be required based on an isolated occurrence; however, a corrective action should be taken if the situation does not improve, or a negative trend is identified. The monitoring should then focus on the particular runway or aircraft series or combination of those.

(iii) High (‘red’): the deviation is undesirably high. Investigation and corrective action should be undertaken even based on an isolated occurrence. The threshold for level high (‘red’) may be based on the criteria of GM1 SPA.LVO.105(g).

The following GM3 SPA.LVO.105(g) is inserted:

GM3 SPA.LVO.105(g) Specific approval criteria

DATA GATHERING FOR SAFETY ASSESSMENT PRIOR TO OBTAINING AN APPROVAL

(a) General

The intention of the safety assessment is to validate the use and effectiveness of the applicable aircraft flight control and guidance systems, procedures, flight crew training and aircraft maintenance programme. The intention is not to repeat the statistical analysis required for certification of equipment, but rather to demonstrate that the various elements of the ‘total system’ for LVOs work together for a particular operator.

(b) Data gathering for safety assessment — LVTOs

(1) If the procedures used for LVTOs are not significantly different from those used for standard take-offs, it may be sufficient for operators to conduct only a small number of take-offs using the procedures established for LVTOs for the purpose of data gathering. The following could be considered as a minimum:

(i) For LVTOs in an RVR of 125m or more if procedures are similar to those used for standard take-offs: 1 take-off;

(ii) For LVTOs in an RVR of less than 125m or any other LVTOs using specific procedures: 10 take-offs.

(2) An operator holding an approval for LVTOs on one aircraft type and applying the approval for LVTOs on another type or variant may use data from LVTOs conducted on the first type if the following are similar:

(i) level of technology, including flight deck displays, HUD or an equivalent guidance system;

(ii) operational procedures; and

(iii) handling characteristics.

(c) Data gathering for safety assessment — approach operations with a DH below 200ft

The data required for the safety assessment needs to be gathered from approaches conducted in a representative sample of expected operating conditions. The operator needs to take seasonal variations in operating conditions such as prevalent weather, planned destinations and operating bases, and ensure that the approaches used for data gathering are conducted over a sufficient period of time to be representative of the planned operation.

In order to ensure that the data is representative of planned operations, approaches are conducted at a variety of airports and runways. If more than 30 % of the approaches are conducted to the same runway, the operator may increase the number of approaches required and take measures to ensure that the data is not distorted.

The number of approaches used for data gathering will depend on the performance indicators and analysis methods used by the operator. The operator will need to demonstrate that the operation for which approval is sought will achieve an acceptable level of safety. The following figures may be considered a minimum for an operator without previous experience of low-visibility approach operations:

(1) for approval of operations with a DH of not less than 50ft: 30 approaches;

(2) for approval of operations with a DH of less than 50ft: 100 approaches.

Approaches conducted for the purpose of gathering data in order to conduct a safety assessment prior to obtaining an LVO approval may be conducted in line operations or any other flight where the operator's procedures are used. Approaches may also be conducted in an FSTD if the operator is satisfied that this would be representative of the operation.

The data gathered from these approaches will only be representative if all required elements of the total system for LVOs are in place. These include not only operating procedures and airborne equipment, but also airport and ATC procedures and ground- or space-based navigation facilities. If the operator chooses to collect data from approaches conducted without all required elements in place, then the data analysis takes into account the effect of at least the following:

(1) air traffic services (ATS) factors including situations where a flight conducting an instrument approach is vectored too close to the FAF for satisfactory lateral and vertical path capture, lack of protection of ILS sensitive areas or ATS requests to discontinue the approach;

(2) misleading navigation signals such as ILS localiser irregularities caused by taxiing aircraft or aircraft overflying the localiser array;

(3) other specific factors that could affect the success of LVOs that are reported by the flight crew.

(d) Safety considerations for approaches used for data gathering

If an operator chooses to collect data from approaches conducted without all required elements of the total system for LVOs in place, then the operator takes actions to ensure an acceptable level of safety.

(e) Sharing of data: operators may use data from other operators or aircraft manufacturers to support the safety assessment required to demonstrate an acceptable level of safety. The operator applying for a specific approval would need to demonstrate that the data used was relevant to the proposed operation.

(f) It is expected that operators will have more than 6 months or at least 1 000 hours of total operational experience on the aircraft model before they can have sufficient data to set up meaningful performance indicators and establish whether planned LVOs would achieve an acceptable level of safety.

GM1 SPA.LVO.110(c)(4)(i) is deleted:

~~GM1 SPA.LVO.110(c)(4)(i) General operating requirements~~

~~**APPROVED VERTICAL FLIGHT PATH GUIDANCE MODE**~~

~~The term 'approved' means that the vertical flight path guidance mode has been certified by the CAA as part of the avionics product.~~

The following AMC1 SPA.LVO.110 is inserted:

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

SUITABLE AERODROMES — APPROACH AND LANDING ASSESSMENT — AEROPLANES

(a) The assessment of the suitability of an aerodrome, including instrument flight procedures, for the intended operations comprises the availability of:

(1) suitable navigation facilities and associated instrument flight approach procedures;

(2) suitable aerodrome operating procedures, including LVPs, and the compatibility with the intended aircraft operations; and

(3) suitable runway and runway environment characteristics and facilities.

(b) The assessment of the suitability of an aerodrome, including instrument flight procedures, for the intended operations should be made by means of one or a combination of the following:

(1) An assessment of previous operational data for the particular aerodrome, runway and instrument flight procedures. This entails the verification of the availability of previous operational data, such as records of approaches flown in the same aerodrome, with the same procedures and aircraft type.

(2) A desktop assessment of the:

(i) aerodrome data;

(ii) instrument flight procedures; and

(iii) the aircraft data and capabilities.

This desktop assessment compares aircraft data and capabilities and the aerodrome and instrument approach characteristics. If the aircraft data is compatible with the aerodrome and instrument approach procedure characteristics, the aerodrome and runway should be considered suitable for the intended LVO;

(3) An operational assessment

This is meant to be used if the suitability of the aerodrome for the intended operations could not be positively assessed by means of the other methods. In that case, an operational assessment becomes necessary, and actual flights should be performed. The operational assessment should consider the level of complexity of the aerodrome characteristics.

ASSESSMENT OF PREVIOUS OPERATIONAL DATA

(c) Previous operational data refers to data from:

(1) the operator itself, or when not available;

(2) the following entities:

(i) the State of the aerodrome or the competent authority issuing the operator's LVO approval;

(ii) the type certificate holder of the aircraft; or

(iii) other operators.

(d) Previous operational data should only be used if:

(1) it concerns the same runway and there were no relevant changes to the runway and runway environment;

(2) it is derived in accordance with Table 14 below for the intended operation; and

(3) there is no safety concern for such operation.

(e) Previous operational data may be credited to an aircraft if it is from:

(1) the same aircraft make and model, unless the credit from the same aircraft make and model is restricted by any of the entities in point (c)(2); or

(2) another aircraft model, if stated in the AFM or additional data from the TC/STC holder.

Table 14

Intended operation	**Operation from which previous operational data was derived – subject to the conditions specified in points (c), (d) and (e)**	**Remark**
SA CAT I – automatic landing	CAT I/II/III — automatic landing SA CAT I — automatic landing SA CAT II — automatic landing LTS CAT I — automatic landing.	Automatic landing in hybrid systems may also be used
SA CAT I — HUDLS	CAT II/III — HUDLS SA CAT I — HUDLS SA CAT II — HUDLS	

	LTS CAT I — HUDLS	
SA CAT II — automatic landing	CAT II/III — automatic landing SA CAT II — automatic landing	Automatic landing in hybrid systems may also be used
SA CAT II — HUDLS	SA CAT II — HUDLS CAT II/III — HUDLS	
CAT II — HUD to below DH with manual landing	CAT II — HUD to below DH with manual landing CAT II or CAT III — automatic landing CAT II or CAT III HUDLS SA CAT II HUDLS	Data related to the LSAA should only be used in the case of HUDLS or automatic landing
CAT II — auto-coupled to below DH with manual landing	CAT II — auto-coupled to below DH with manual landing CAT II or CAT III — automatic landing SA CAT II automatic landing	
CAT II — automatic landing	CAT II — automatic landing SA CAT II — automatic landing CAT III automatic landing	Automatic landing in hybrid systems may also be used
CAT II — HUDLS	CAT II or CAT III — HUDLS SA CAT II — HUDLS	
CAT III — HUDLS	CAT III — HUDLS	
CAT III— automatic landing	CAT III — automatic landing	If the hybrid system uses automatic landing, then the data may be used as any CAT III system.
CAT III — hybrid system	CAT III — hybrid system based on same components	
EFVS operations requiring flare prompt or flare command, i.e. EFVS-L	EFVS operations requiring flare prompt or flare commands	

Note: Previous operational data should be based on the same kind of xLS (e.g. ILS to ILS, MLS to MLS or GLS to GLS). Data related to landing system performance derived from infrastructure systems with lower performance may be used on systems with higher performance (e.g. data derived from a CAT II ILS may be used on a CAT III ILS). However, an ILS may qualify a GLS operation under the following conditions:

— The performance of the ILS installation on which the data is based can only be credited to the ILS point promulgate.

— An ILS facility performance category II installation can only be credited to an operation using GAST C.

— An ILS facility performance category III installation can only be credited to an operation GAST C or GAST D.

DESKTOP ASSESSMENT — AERODROME DATA, INSTRUMENT FLIGHT PROCEDURE AND AIRCRAFT DATA AND CAPABILITIES

(f) The desktop assessment should correspond to the nature and complexity of the operation intended to be carried out and should take into account the hazards and associated risks inherent in these operations.

(g) The assessment should include the AFM or additional data from the TC/STC holder, instrument flight procedures and aerodrome data. For landing systems, the runway or airport conditions should include as a minimum:

(1) the approach path slope;

(2) the runway elevation;

(3) the type of xLS navigation means intended to be used;

(4) the average slope of the LSAA; and

(5) the ground profile under the approach path (pre-threshold terrain). The distance should be calculated from the published threshold. It should be 300 metres, unless otherwise stated by the AFM or additional data from the TC/STC holder, the State of the aerodrome or AIP data, or the competent authority issuing the operator's LVO approval.

Note: The above points assume a CAT II or CAT III runway. For other types of runways, the operator may need to consider other factors.

(h) In addition to (g), additional elements may need to be included in the assessment if stated by:

(1) the AFM, or additional data from the TC/STC holder; or

(2) the State of the aerodrome or AIP data; or

(3) the competent authority issuing the operator's LVO approval.

(i) For EFVS operations, the following applies:

If the system used to perform an EFVS operation contains a flare cue, each aircraft type/equipment/runway combination should be verified before authorising the use of EFVS-L, on any runway with irregular pre-threshold terrain (not within the certification assumption for pre-threshold terrain), if the LSAA presents significant slope change.

OPERATIONAL ASSESSMENT

(j) When performing an operational assessment, the operator should verify each aircraft type and runway combination by successfully completing the determined number of approaches and landings according to the process in point (l) below and the conditions determined in Table 15.

Table 15 Meteorological conditions for approaches and landings intended for operational assessment

Type of approach	**RVR/VIS**
CAT III	CAT II conditions if the approach was previously successfully assessed in CAT II operations
CAT II & CAT III	CAT I conditions
EFVS-A	As per instrument approach no EFVS credits
SA CAT I & SA CAT II	CAT I conditions

(k) The operational assessment should validate the use and effectiveness of the aircraft flight guidance systems, and operating procedures for the intended operation applicable to a specific instrument flight procedure and runway.

(l) The process to determine the number of approaches and landings should be based on identified risks and agreed with the CAA, and comprise the following steps:

(1) Identify the risks related to the landing system (based on the AFM or additional data from the TC/STC holder) which may include limitations in the conditions during the operational assessment (e.g. to perform the assessment under a non-commercial flight).

(2) Determine complexity of the runway based on:

(i) a set of criteria based on the certification assumptions identified in the AFM or additional data from the TC/STC holder;

(ii) availability and quality of runway data supporting the risk assessment;

(iii) other known factors identified.

(3) Scale the number of required approaches based on complexity.

(m) The operational assessment may be performed in a commercial flight.

(n) If the operator has different variants of the same type of aircraft, utilising the same landing systems, the operator should show that the variants have satisfactory operational performance, but there is no need to conduct a full operational assessment for each variant/runway combination.

(o) The operator may replace partially or completely the approaches and landings to a particular runway, if approved by the CAA, with:

(1) simulations made by the aircraft manufacturer or approved design organisations, if the terrain is properly modelled in the simulation;

(2) a verification using an FSTD, if the FSTD is suitable for the operational assessment.

ADDITIONAL VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS OPERATIONS

(p) The assessment of the suitability of the aerodrome should include whether the approach and runway lights installed (notably incandescent or LED lights) are adequate for the EFVS equipment used by the operator.

(q) Additionally, the operator should assess obstacles for the following operations:

(1) NPA procedures;

(2) APV;

(3) category I PA procedures on runways where an OFZ is not provided; and

(4) approach procedures not designed in accordance with PANS-OPS or equivalent criteria.

(r) The assessment in point (q) should determine whether:

(1) obstacle protection can be ensured in the visual segment from DA/H to landing, without reliance on visual identification of obstacles or in the event of a balked landing; and

(2) obstacle lights installed (notably incandescent or LED lights) are adequate for the EFVS equipment used by the operator.

(s) If the assessment determines that:

(1) obstacle clearance cannot be ensured in the visual segment without reliance on visual identification of obstacles, the operator should not authorise EFVS operations to that runway or restrict the operation to the type and/or category of instrument approach operations where obstacle protection is ensured.

Note: Obstacles of a height of less than 50 ft above the threshold may be disregarded when assessing the VSS.

(2) obstacle protection is not assured in the event of a go-around initiated at any point prior to touchdown, the operator should not authorise the operation unless procedures to mitigate the risk of inadequate obstacle protection are developed and implemented.

(t) If the AFM stipulates specific requirements for approach procedures, the operational assessment should include a determination of whether these requirements can be met.

The following AMC2 SPA.LVO.110 is inserted:

AMC2 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE INSTRUMENT FLIGHT APPROACH PROCEDURES

(a) CAT II instrument approach operations should only be conducted using a CAT II IAP.

(b) CAT III instrument approach operations should only be conducted using a CAT III IAP.

(c) SA CAT I operations should only be conducted using a SA CAT I IAP or, if not available, a CAT I IAP that includes an OCH based on radio altimeter.

(d) SA CAT II operations should only be conducted using a SA CAT II IAP or, if not available, a CAT II IAP.

(e) EFVS operations should only be conducted using an IAP which is offset by a maximum of 3 degrees unless a different approach offset is stated in the AFM.

The following AMC3 SPA.LVO.110 is inserted:

AMC3 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — RUNWAY AND RUNWAY ENVIRONMENT — NAVIGATION FACILITIES — APPROACH OPERATIONS OTHER THAN EFVS OPERATIONS

(a) For CAT II instrument approach operations, a PA runway category II or category III should be used. The following visual aids should be available:

(1) category II approach lights;

(2) standard runway markings;

(3) category II runway lights.

(b) For CAT III instrument approach operations, a PA runway category III should be used. The following visual aids should be available:

(1) category III approach lights;

(2) standard runway markings;

(3) category III runway lights.

(c) For SA CAT I operations:

(1) where an ILS or MLS or GLS is used, it should not be promulgated with any restrictions affecting its usability and should not be offset from the extended centre line;

(2) where an ILS or GLS is used, it should be at least the minimum ILS or GLS classification stated in the AFM and meet any of the required minimum performance parameters stated in the AFM;

(3) the glide path angle is 3.0°; a steeper glide path, not exceeding 3.5° and not exceeding the limits stated in the AFM, can be approved provided that an equivalent level of safety is achieved; and

(4) runway markings, category I approach lights as well as runway edge lights, runway threshold lights, and runway end lights should be available.

(d) For SA CAT II operations:

(1) where an ILS or MLS or GLS is used, it should not be promulgated with any restrictions affecting its usability and should not be offset from the extended centre line;

(2) where an ILS or GLS is used, the following applies:

(i) if the AFM provides such data, the minimum ILS or GLS classification stated in the AFM; or

(ii) when such data is not provided:

(A) where an GLS is used, it should be certified to at least GAST-C and to the GBAS point D;

(B) where an ILS is used, it should be certified to at least class II/D/2;

(3) the glide path angle is 3.0°; a steeper glide path, not exceeding 3.2°, can be approved provided that the operator demonstrates an equivalent level of safety; and

(4) the following visual aids should be available:

(i) standard runway markings, category I approach lights as well as runway edge lights, runway threshold lights and runway end lights; and

(ii) for operations with an RVR of less than 400m, centre line lights.

The following AMC4 SPA.LVO.110 is inserted:

AMC4 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

COLLECT AND DEVELOP AIRPORT DATA NOT CONTAINED IN THE AIP — AEROPLANES

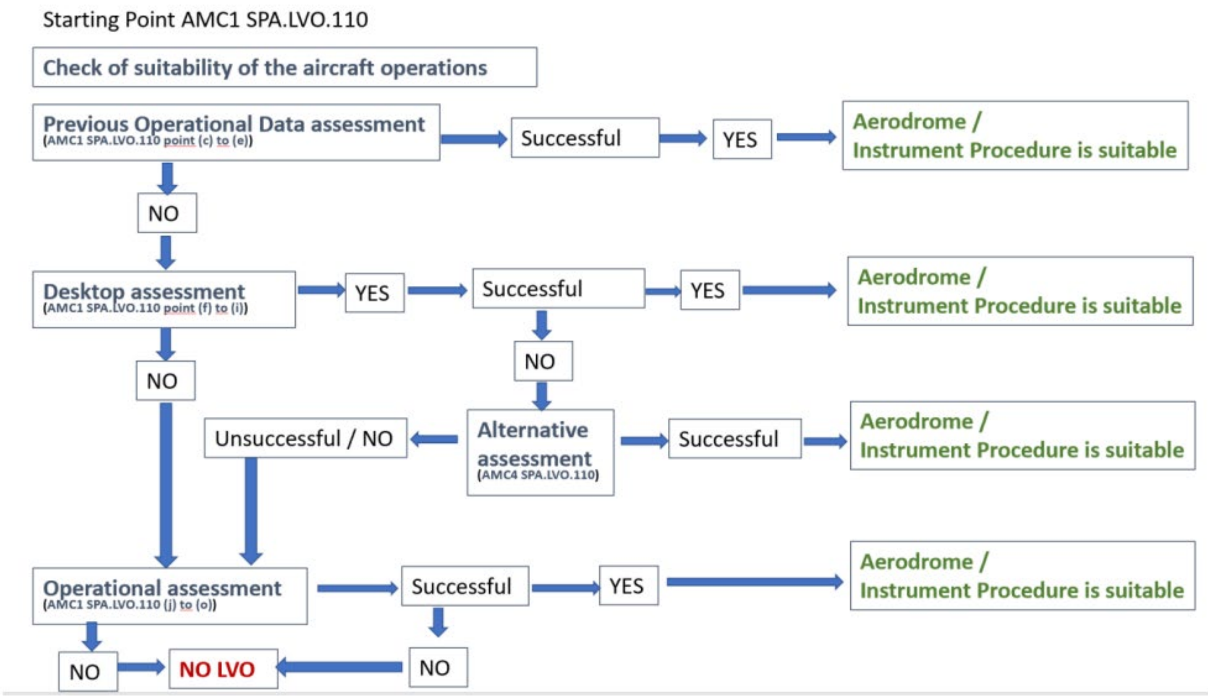
When the operator wishing to use an aerodrome where its relevant data for the purpose of LVO is not provided or some data is not provided, the operator should develop procedures to collect or develop the necessary data. The procedure should be specific to the State of the aerodrome or the area of operation and should be approved by the CAA.

The following GM1 SPA.LVO.110 is inserted:

GM1 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

ASSESSMENT OF AERODROMES FOR THE INTENDED OPERATIONS — AEROPLANES

A diagram with a schematic of the assessment described in AMC1 SPA.LVO.110 *Aerodrome-related requirements, including instrument flight procedures* is provided below:



The following GM2 SPA.LVO.110 is inserted:

GM2 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures.

SUITABLE AERODROMES — ASSESSMENT — AVAILABILITY OF SUITABLE NAVIGATION FACILITIES

As detailed in point (a) of AMC1 SPA.LVO.110, the assessment of the suitability of an aerodrome, including instrument flight procedures, for the intended operations comprises the availability of suitable navigation facilities and associated instrument flight approach procedures.

When assessing the availability of suitable navigation facilities, the following information is relevant.

(a) Classification for ILS: the ILS classification, e.g. ‘III/E/4’, II/T/3, ‘I/C/2’, etc., is defined in ICAO Annex 10 Volume 1 by using three characters:

(1) I, II or III: this character indicates conformance to the facility performance category which is usually associated with the approach operational category,

(2) A, B, C, T, D or E: this character defines the ILS points to which the localiser/glide path has been verified to be conformal to the course structure of a localiser CAT II/III or glide path CAT II/III (where glide path is always limited to T).

(3) 1, 2, 3 or 4: this number indicates the level of integrity and continuity of service. The integrity relates to the trust which can be placed in localiser or glide path not radiating false guidance signals. The continuity of service relates to the rarity of signal interruptions. The minimum levels of integrity and continuity of service are represented by a single descriptor ‘level’ which would typically be associated as follows:

(i) Level 1: the localiser’s or glide path’s integrity or continuity of service have not been demonstrated or they have been demonstrated but at least one of them does not meet the level 2 requirements.

(ii) Level 2 is the performance objective for ILS equipment used to support LVOs when ILS guidance for position information in the landing phase is supplemented by visual cues/references.

(iii) Level 3 is the performance objective for ILS equipment used to support operations which place a high degree of reliance on ILS guidance for positioning through touchdown.

(iv) Level 4 is the performance objective for ILS equipment used to support operations which place a high degree of reliance on ILS guidance throughout touchdown and roll-out.

Further information may be found in ICAO Annex 10 Volume 1.

(b) GBAS facility classification (GFC)

The facility classification, e.g. i.e. ‘C/G1/35/H’, refers to the station serving all approaches to a given airport and is defined in ICAO Annex 10 Volume 1 using four elements:

(1) Facility approach service type (FAST): (A-D) indicate the service types supported by the navigation facility, i.e. ‘C’ means FAST C, which denotes a facility meeting all the performance and functional requirements necessary to support GBAS approach service type (GAST) C. GAST C has been designed to meet requirements for CAT I as well as, with additional constraints, CAT II. GAST D has been designed to meet requirements for CAT III. A downgrade from GAST D to C is possible and announced in the avionics.

(2) Ranging source types: these indicate what ranging sources are augmented by the ground subsystem. i.e. ‘G1’ means GPS (‘G2’: SBAS, ‘G3’: GLONASS, ‘G4’: reserved for Galileo, etc.).

(3) Facility coverage: this defines the outer horizontal coverage of the GBAS positioning service expressed in nautical miles. ‘0’ is for facilities that do not provide positioning service. The facility coverage for position service does not indicate the coverage for the GBAS approach service. The information on the coverage for the approach service is contained in the ‘Service volume radius from the GBAS reference point’ to the nearest kilometre or nautical mile as described in point (d) below.

(4) Polarisation: this indicates the polarisation of the VHF Data Broadcast (VDB) signal. E indicates elliptical polarisation (option), and H indicates horizontal polarisation (standard). Aircraft operators that use vertically polarised receiving antennas will have to take this information into account when managing flight operations, including flight planning and contingency procedures.

Further information may be found in ICAO Annex 10 Volume 1.

(c) Approach facility designation (AFD) for GBAS

The approach facility designation, e.g. ‘EDDF/G25A/20748/S/C’ or ‘ABCD/XABC/21278/150/CD’, describing parameters for an individual approach procedure, is defined in ICAO Annex 10 using five elements:

(1) GBAS identification: 4-character facility identifier, e.g. ABCD.

(2) Approach identifier: 4-character approach identifier, e.g. XABC.

(3) Channel number: 5-digit channel number (20 001 – 39 999) associated with the approach.

(4) Approach service volume: this indicates the inner limit of the service volume either by a numerical value in feet corresponding to the minimum decision height (DH), e.g. '150', or by the GBAS points (i.e. A, B, C, T, D, E, or S). The GBAS points are equivalent to the ILS points, where 'S' is only specific to GBAS and denotes the stop end of the runway.

(5) Supported service types: these designate the supported GBAS service types (A-D).

Further information may be found in ICAO Annex 10 Volume 1.

(d) Service volume radius from the GBAS reference point

Maximum use distance (D_{max}): the maximum distance (slant range) from the GBAS reference point to the nearest kilometre or nautical mile within which pseudo-range corrections are applied by the aircraft system.

Note: This parameter does not indicate the distance within which VHF data broadcast field strength requirements for the approach service are met.

Further information may be found in ICAO Annex 10 Volume 1.

TYPE OF xLS NAVIGATION MEANS

(e) In the context of AMC1 SPA.LVO.110 point (g)(3), 'type of xLS navigation means' means the facilities external to the aircraft and the associated limitations (if any) which have been used as the basis for certification.

The following GM3 SPA.LVO.110 is inserted:

GM3 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — ASSESSMENT — SUITABLE RUNWAY AND RUNWAY ENVIRONMENT CHARACTERISTICS

(a) As detailed in point (a) of AMC1 SPA.LVO.110, the assessment of the suitability of an aerodrome, including instrument flight procedures, for the intended operations comprises the availability of suitable runway and runway environment characteristics.

(b) For operations based on radio altimeter or other device measuring the height over the ground:

(1) the suitability of the indication of the DH should be based on data covering the actual DH location. This indication should be expected to be stable and continuous;

(2) The suitability of the indication of the alert height (where applicable) should be based on data covering the actual alert height location. This indication should be expected to be stable and continuous.

(3) The primary source of information to determine the suitability should be the precision approach terrain chart (PATC). If the information is not conclusive, the operator may collect

and develop airport data not contained in the AIP. More information can be found in GM10 SPA.LVO.110.

(c) For runways intended to be used for CAT III, CAT II, SA CAT II and SA CAT I operations, the State of aerodrome should provide a PATC. More information is provided in GM7 SPA.LVO.110.

(d) There should be a radio altimeter operating area for runways intended to be used for EFVS-L, CAT III, CAT II, SA CAT II and SA CAT I operations. The ICAO aerodrome provisions detail that the radio altimeter operating area extends to at least 300m from the runway threshold with a width of 60 metres on either side of the extended centre line of the runway. The width may be reduced to not less than ± 30 metres if such a reduction does not affect the safety of aircraft operations as assessed by the aerodrome operator in cooperation with affected stakeholders. Slope changes should be kept to a minimum.

(e) Information on pre-threshold terrain and its effect on radio altimeters and automatic flight control systems (AFCS) is contained in the Manual of All-Weather Operations (ICAO Doc 9365, Section 5.2.)

SUITABLE AERODROMES — ASSESSMENT — PREVIOUS OPERATIONAL DATA — RUNWAY AND RUNWAY ENVIRONMENT

(f) As detailed in point (d)(1) of AMC1 SPA.LVO.110, previous operational data should only be used to assess the suitability of an aerodrome for the intended operations when it concerns the same runway and there were no relevant changes to the runway and runway environment.

(g) Relevant changes to the runway and runway environment may include changes to:

(1) the pre-threshold terrain, including the radio altimeter operating area;

(2) runway dimensions;

(3) the average slope of the landing system assessment area (LSAA);

(4) visual aids including approach lights and runway lights;

(5) the obstacle free zone (OFZ);

(6) the visual segment surface (VSS) — only relevant for operational credits in the visual segment (EFVS).

The following GM4 SPA.LVO.110 is inserted:

GM4 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — ASSESSMENT — PREVIOUS OPERATIONAL DATA PROVIDED BY THE STATE OF THE AERODROME

(a) As detailed in point (b)(1) of AMC1 SPA.LVO.110, the assessment of the suitability of an aerodrome, including instrument flight procedures, for the intended operations, may be made considering previous operational data for the particular aerodrome, runway and instrument flight procedures.

(b) The following guidance is provided for the assessment of suitability of aerodromes for LVOs or operations with operational credits:

(1) If a State provides data related to airports or runways in its territory that are suitable for CAT II or CAT III operations with a specific aircraft model or group of aircraft models, those airports or runways may be considered suitable for the purpose of AMC1 SPA.LVO.110. Note: A CAT II or CAT III approved runway does not necessarily mean that the airport is suitable for the purpose of AMC1 SPA.LVO.110 as the aerodrome's provisions may not ensure that the requirements for certain aircraft models are fulfilled.

(2) If a State provides data related to airports or runways in its territory that are found suitable for SA CAT I or SA CAT II, those airports or runways may be considered suitable for the purpose of AMC1 SPA.LVO.110. Note: In some States the concept of SA CAT I and SA CAT II may be different from the UK concept. The operator should consider these differences.

(3) If a State provides data related to airports or runways in its territory that are approved for CAT II/III operations but are designated as restricted or non-standard or irregular, those designated runways should be considered not suitable. The remaining CAT II/III runways of that State may be considered regular.

(4) A competent authority may provide data related to airports or runways that can be considered suitable for defined LVOs. The suitability statement could be credited by operators under the oversight of that authority.

The following GM5 SPA.LVO.110 is inserted:

GM5 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures.

SUITABLE AERODROMES — ASSESSMENT — PREVIOUS OPERATIONAL DATA — TERMINOLOGY: MAKE, MODEL, SERIES AND VARIANT

The following terms, in accordance with the ICAO Commercial Aviation Safety Team (CAST) taxonomy, are often used (e.g. AMC1 SPA.LVO.110):

(a) Aircraft make: The aircraft make is the name assigned to the aircraft by the aircraft manufacturer when each aircraft was produced. In most cases, the aircraft make is the common name of the aircraft manufacturer; for example, Airbus, Boeing, Embraer, etc.

(b) Aircraft model: An aircraft model is an aircraft manufacturer's designation for an aircraft grouping with a similar design or style of structure. In EASA type certificate data sheet (TCDS), this means the aircraft type certificate; for example, A330, B777.

(c) Aircraft series: An aircraft series is an aircraft manufacturer's designation to identify differences within an aircraft model grouping. It provides a further specification to the aircraft type; for example, B777-232 where the series is the number 232. Some manufacturers define the so-called master series: An aircraft master series creates a grouping of similar aircraft series for analytical purposes and to identify aircraft series that share airworthiness properties. A master series contains aircraft series from within one aircraft model. For example, A320-100 and A320-200: the

A320-100 master series only has one series (A320-111), while the A320-200 master series has many series (211, 212, 214, 215, 216, 231, 232, 233).

(d) Aircraft variant; a variant defines different sets of limiting structural masses (e.g. MTOW, MLW, MZFW, etc.) within a series. For example, A320-232-007 or the A330-243 RR engine's variant 052. Variants are not covered in the ICAO Cast taxonomy; however, they may be specified in the EASA TCDS.

(e) More information can be found in ICAO documentation.

The following GM6 SPA.LVO.110 is inserted:

GM6 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — DESKTOP ASSESSMENT — DATA NOT PROVIDED IN THE AFM

(a) When the AFM or additional data from the TC/STC holder does not provide the information needed in AMC1 SPA.LVO.110 points (g)(1) to (5), the operator may contact the TC/STC holder to request such information. Otherwise the operator may seek to use previous operational data or perform operational demonstration in accordance with AMC1 SPA.LVO.110.

SUITABLE AERODROMES — DESKTOP ASSESSMENT — USE OF PREVIOUS OPERATIONAL DATA

(b) In-service consolidated experience from already successfully demonstrated and consistently used runways with the specific aircraft type and with the same intended operations (typically CAT II/III) could be used to support the desktop assessment. The assessment criteria, for pre-threshold terrain variation and LSAA slope, could then be defined by the prevailing complexity of the runway on which the operator already has in-service experience and where sufficient operational flight data is available to prove adequate performance of the automatic landing system.

The following GM7 SPA.LVO.110 is inserted:

GM7 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — DESKTOP ASSESSMENT — AERODROME DATA SOURCES

As detailed in point (b)(2) of AMC1 SPA.LVO.110, the assessment of the suitability of an aerodrome, including instrument flight procedures, for the intended operations, may be made by a desktop assessment, that should consider aerodrome data.

This GM describes some aerodrome data sources that ICAO Member States provide in accordance with ICAO Annex 4.

(a) Type A and Type B aerodrome obstacle charts

Aerodrome obstacle charts come in two forms. Type A and B charts may be combined, and the chart is called aerodrome obstacle chart (ICAO Comprehensive). Where a terrain and obstacle chart is provided in electronic form, there is no need to provide Type A or B aerodrome obstacle charts.

(b) Type A aerodrome obstacle chart (ICAO Annex 4, Chapter 3)

Type A aerodrome obstacle charts are found at most aerodromes approved for LVOs. The function of the Type A chart is to enable an operator to comply with the performance operating limitations in Annex 6. The Type A chart does not have to be provided if there are no take-off obstacles, but a note informing about this is needed according to ICAO Annex 4. The elevation is given to the nearest half-metre or nearest foot. Linear dimensions are shown to the nearest half metre.

(c) Type B aerodrome obstacle chart (ICAO Annex 4, Chapter 4)

Type B aerodrome obstacle charts contain information about the elevation (at the centre line) of both runways plus the elevation at each significant change of the slope of the runway. The function of the Type B chart is:

(1) the determination of minimum safe altitudes/heights including those for circling procedures;

(2) the determination of procedures for use in the event of an emergency during take-off or landing;

(3) the application of obstacle clearing and marking criteria; and

(4) the provision of source material for aeronautical charts.

Elevations and linear dimensions are shown to the nearest half metre.

(d) Aerodrome terrain and obstacle Chart – ICAO (Electronic) (ICAO Annex 4, Chapter 5)

The function of this chart is to:

(1) enable an operator to comply with the operating limitations of Annex 6, Part I, Chapter 5, and Part III, Section II, Chapter 3, by developing contingency procedures for use in the event of an emergency during a missed approach or take-off, and by performing aircraft operating limitations analysis; and

(2) support the following air navigation applications:

(i) instrument procedure design (including circling procedure);

(ii) aerodrome obstacle restriction and removal; and

(iii) provision of source data for the production of other aeronautical charts.

Note that this chart may also contain the information required for the PATC.

According to ICAO Annex 4, from November 2015, this chart is made available for aerodromes regularly used by international aviation. The chart is made available in printed form on request.

(e) Aerodrome chart (ICAO Annex 4, Chapter 13)

According to ICAO Annex 4, an aerodrome chart is provided for aerodromes regularly used by international aviation. The function of this chart is to provide information to facilitate the ground movement of aircraft and in general also to provide essential operational information.

This chart contains information about the height of the threshold and, for PA runways, the highest point of the TDZ. This information may also be included in the text part of the AIP, Chapter AD2 (normally paragraph 2.12 – Runway Physical Characteristics). The elevation is provided to the nearest half metre.

(f) Precision approach terrain chart (PATC) (Annex 4, Chapter 6)

According to ICAO Annex 4, a PATC is made available for all PA runways Categories II and III at aerodromes used by international civil aviation, except where the requisite information is provided in the aerodrome terrain and obstacle chart — ICAO (Electronic). The chart includes:

(1) a plan showing contours at 1 m (3 ft) intervals in the area of 60 m on either side of the extended centre line of the runway, to the same distance as the profile, the contours to be related to the runway threshold;

(2i) an indication where the terrain or any object thereon, within the plan defined in (1), differs by ± 3 m in height from the centre line profile and is likely to affect a radio altimeter;

(3) a profile of the terrain to a distance of 900 m from the threshold along the extended centre line of the runway. Where the terrain at a distance greater than 900 m from the runway threshold is mountainous or otherwise significant to users of the chart, the profile of the terrain should be shown to a distance not exceeding 2 000 m from the runway threshold.

(g) Summary

(1) For the determination of runway slopes, the aerodrome obstacle chart, preferably the combined version, appears to provide the best information. The PATC appears to be the best source to determine the elevations and slopes in the approach area.

(2) If the information provided by different parts of the AIP is inconsistent, this may indicate an error in the data and should be reported to the State of aerodrome or AIP issuing authority, unless the inconsistency is insignificant. It should however be noted that there may be different requirements for accuracy and resolution between different AIP charts or sections, which might cause values to differ slightly.

(3) It may be difficult to conclusively state which chart is best for determining the runway slope in each case, but the primary source of information is the AIP, and therein the aerodrome obstacle chart and the PATC. As the aerodrome terrain and obstacle chart – ICAO (Electronic) becomes more available, it will probably take over as the primary source of information about both runways and pre-threshold terrain.

The following GM8 SPA.LVO.110 is inserted:

GM8 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures.

SUITABLE AERODROMES — OPERATIONAL ASSESSMENT — PROCESS TO DETERMINE THE NUMBER OF APPROACHES AND LANDINGS — AEROPLANES

(a) When performing an operational assessment to determine the suitability of an aerodrome for the intended operations, the operator should have a process to determine the number of approaches and landings, in accordance with point (l) of AMC1 SPA.LVO.110. The following guidance provides examples of criteria that can be used to evaluate level complexity of the runway versus a landing system for the purpose of the determination of the number of approaches and landings.

Depending on the landing system used, some criteria might not be relevant, or others might need to be considered.

(1) Pre-threshold terrain profile

The typical length of pre-runway threshold is calculated from the published threshold (displaced threshold if present) to 300m on the extended centre line unless otherwise specified by the AFM or additional data from the TC/STC holder, the State of the aerodrome or AIP data, or the CAA issuing the operator’s LVO approval. The complexity of the pre-threshold terrain profiles is described as follows:

(i) Simple

(A) approximately ± 1 m variation from runway threshold elevation in the typical length; or

(B) previous experience in more constraining pre-threshold terrain in the same aircraft type or variant.

(ii) Moderate

(A) presence of ARAS; or

(B) approximately ± 1 m variation from runway threshold elevation within the last 60 m prior to runway threshold; and

(C) prior to 60 m and up to typical length:

— moderate rising slope (less than 7 % rising); or

— moderate ‘sea wall’ (less than 3 m).

(iii) Complex

(A) approximately ± 2 m variation from runway threshold elevation within the last 60 m prior to runway threshold; and

(B) prior to 60 m and up to typical length:

— significant rising slope (up to 15 % rising); or

— significant ‘see wall’ (up to 6 m); or

— significant change of slope (rising then descending or descending then rising close to the limit values)

(iv) Very complex

Outside any of the limits defined above for complex pre-threshold terrain profiles.

Note: The term ‘sea wall’ refers to sudden changes of terrain elevation that typically occur when runway thresholds are located near the sea. Sea level may change due to tides. Other cases of sudden terrain elevation may occur in other cases, a slope of 100 % may be considered as comparable to ‘sea wall’ (e.g. Boston USA).

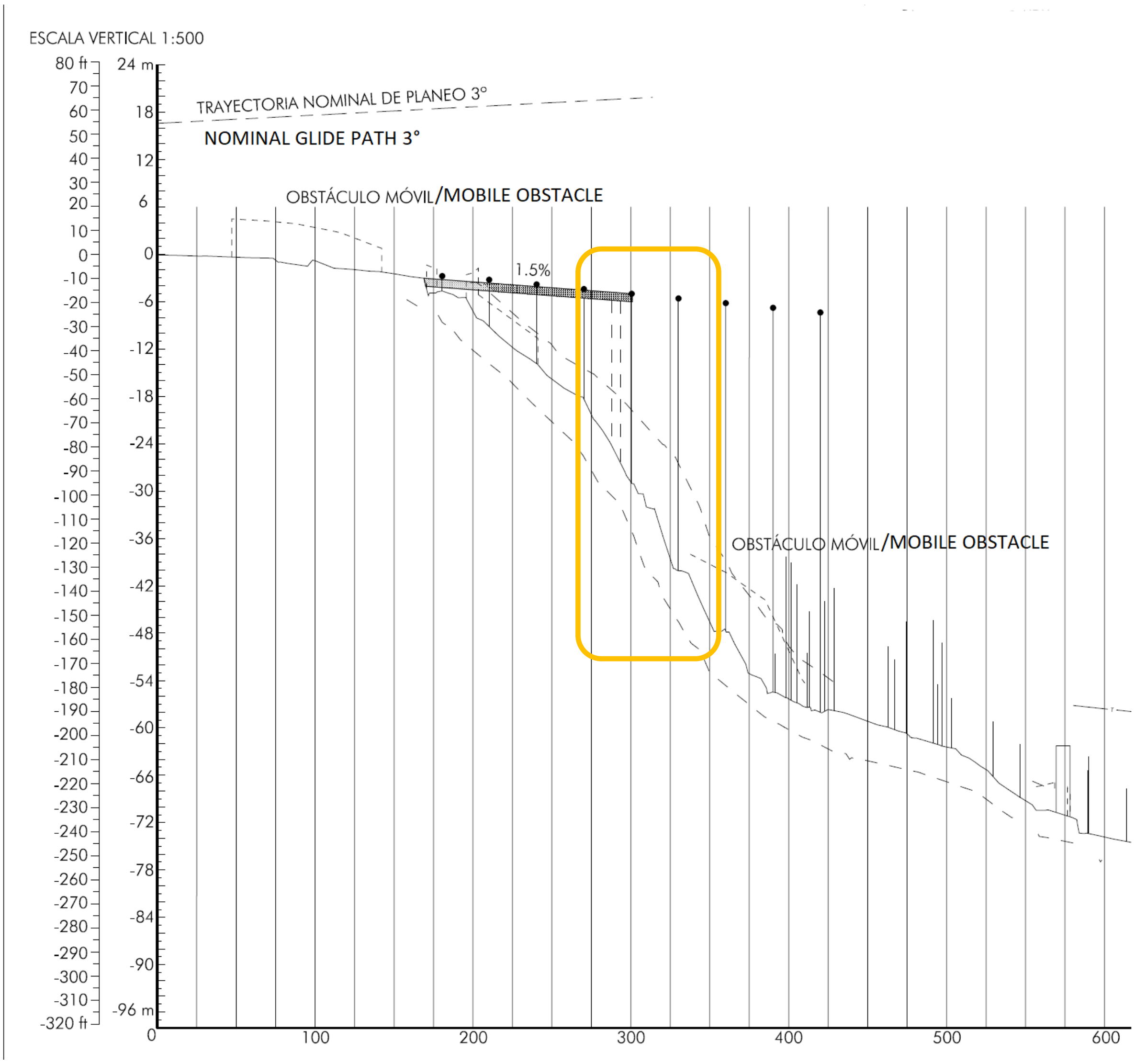


Figure 0: *Typical example of 'very complex' with greater than 6 m 'sea wall' at 300 m (Asturias, LEAS 29 dated 2007) that after suitability assessment and due to the presence of ARAS, may be changed to* ***'moderate'.***

Example: A pre-threshold terrain with the following features would be considered as 'moderate'.

(1) Less than 1 m variation of pre-threshold terrain elevation from runway threshold elevation, in the area from runway threshold up to 100 m prior to runway threshold

(2) Less than 3 m variation of pre-threshold terrain elevation from runway threshold elevation, in the area from 100 m prior to runway threshold up to 300 m prior to runway threshold

(2) Landing system assessment area (LSAA) slope

Note: 600 metres after the threshold is the standard length; however depending on the landing system, other lengths might be relevant.

Although not recommended by ICAO Annex 14 Volume 1, slope variation in the LSAA can exist (refer to point 3.1.15 to point 3.1.18) and represent a factor of risk to be considered. For the purpose of determining the relevant parameters characterising slope and slope variation, the following definitions may be used (Figure 1):

— Mean LSAA slope: Slope computed from runway threshold elevation up to runway elevation at 600 metres after the threshold.

— Deviation from mean LSAA slope: greatest elevation difference between any runway elevation inside LSAA and mean LSAA slope.

— runway elevation inside LSAA and mean LSAA slope.

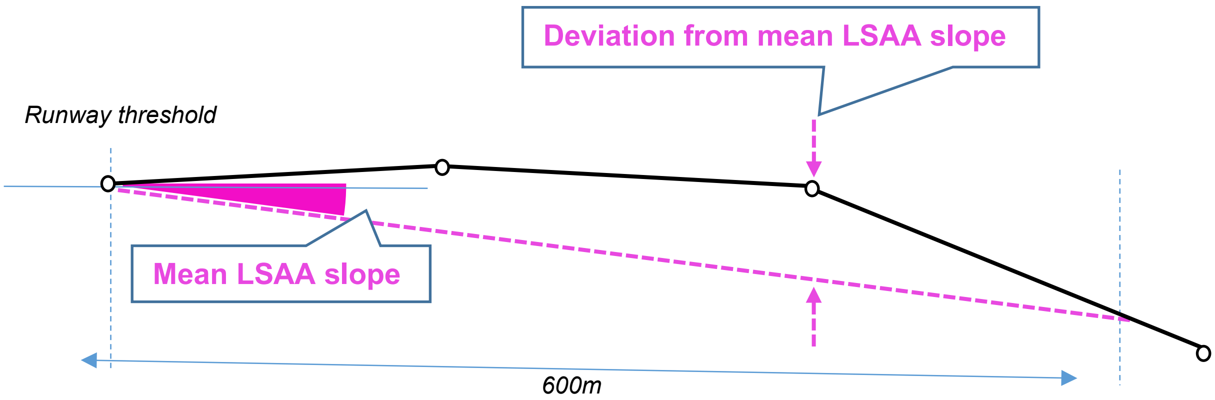


Figure 1: Mean LSAA slope & Deviation from mean LSAA slope

Note: Published runway profiles usually contain the position and elevation of each significant runway longitudinal slope change. Elevation at other location can be interpolated assuming straight slope between each published elevation. The highest / lowest elevation of the LSAA might not be the one where the deviation from mean LSAA slope is the greatest.

(i) Simple

(A) Approximately ± 0.4 % mean LSAA slope and less than 1 m (3 ft) variation around mean LSAA slope; or

(B) previous experience in more constraining touch down condition in the same aircraft type or variant.

(ii) Moderate

Approximately ± 0.8 % mean LSAA slope and less than 2m (6ft) variation around mean LSAA slope.

(iii) Complex

Approximately ± 1.0 % mean LSAA slope and less than 4m (12ft) variation around mean LSAA slope.

(iv) Very complex

Outside any of the limits defined above.

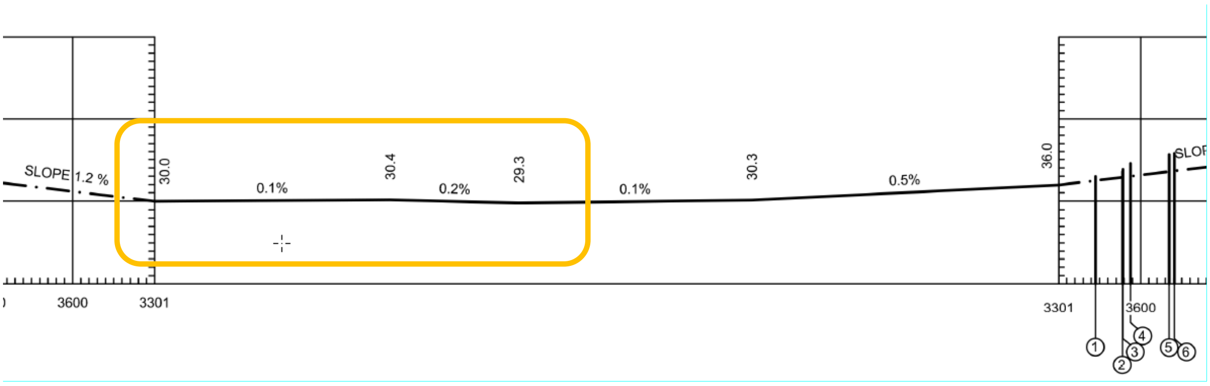


Figure 2: *Typical example of 'simple' LSAA Slope (ESSA 01L dated 2018)*

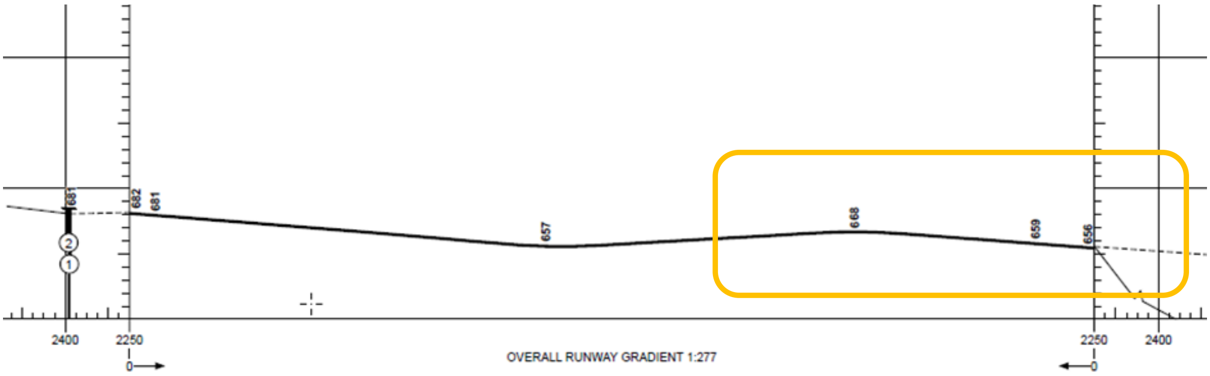


Figure 3: *Typical example of 'moderate' LSAA slope due to variation around mean LSAA slope greater than 1 m but lower than 2m (EGNM 32 dated 2018)*

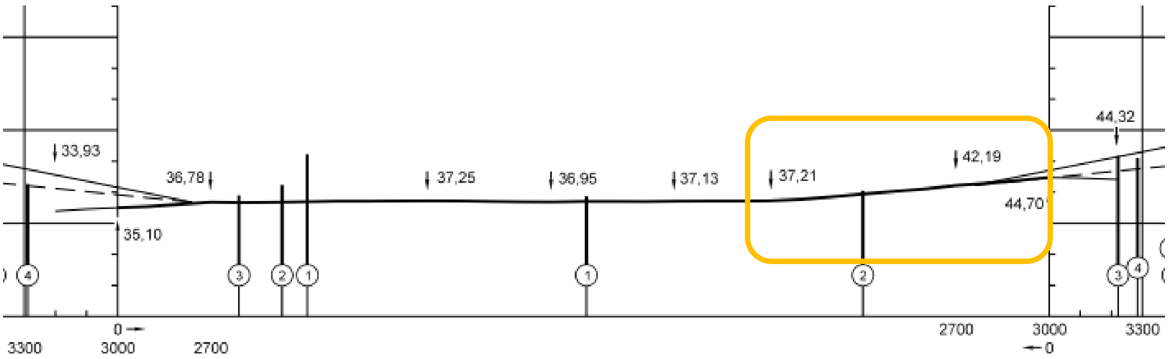


Figure 4: *Typical example of 'complex' mean LSAA slope greater than 0.8 % but lower than 1 % (EDD 23L dated 2009)*

(b) Operational assessment programme: the following guidance provides examples of typical flight programmes that can be used to demonstrate suitability of a landing system using the operational assessment method, considering the overall level of runway irregularities.

Note: For CAT II operations with no use of autoland nor guidance for the flare manoeuvre, the programmes could be alleviated.

The flight programmes are expected to depend on the level of runway irregularities. Table 1 provides examples of criteria that can be used to determine the level of runway irregularities.

Pre-threshold / LSAA slope	Simple	Moderate	Complex	Very complex
Simple	Simple	Moderate	Complex	Very complex
Moderate	Moderate	Moderate	Complex	Very complex
Complex	Complex	Complex	Complex	Very complex
Very complex	Very complex	Very complex	Very complex	Very complex

Table 1: *Level of runway irregularities to scale the flight programme*

(1) Simple runway

For simple runways, unless other factors can be identified as a source of concern, no in-flight approach and landing may be required.

(2) Moderate runway

For moderate runways, a minimum of one successful approach/landing using the procedures, equipment and operationally relevant heights (DH/AH) for the intended operations is performed in the meteorological conditions described in AMC1 SPA.LVO.110 Table 15. More approaches could be required if any issue is identified during this approach/landing.

(3) Complex runway

For complex runways, an initial minimum of three approaches/landings using the procedures, equipment and operationally relevant heights (DH/AH) for the intended operations is performed in the meteorological conditions described in AMC1 SPA.LVO.110 Table 15, with at least one of the landings close to the maximum landing weight for the intended operation and the other two with other different conditions; for example, with a mid-weight in one and low weight in another or with different wind conditions or aircraft configuration flap full/flap 3, or a combination of them. The flights for the assessment are conducted by pilots designated by the operator with defined minimum experience and qualifications, with procedures defined for the purpose. More approaches could be required if any issue is identified during these approaches/landings.

(4) Very complex runway

For very complex runways, an initial minimum of four to six approaches/landings using the procedures, equipment and operationally relevant heights (DH/AH) for the intended operations is performed in the meteorological conditions described in AMC1 SPA.LVO.110 Table 15 in typical aircraft weight conditions in flights with no commercial passengers.

If no anomaly is observed after the first four to six approaches/landings, extend the condition progressively close to the maximum landing weight for the intended operation with at least 15 successful approaches or landings and report any anomalies with the meteorological conditions described in AMC1 SPA.LVO.110 Table 14 and with different conditions, for example with different range of weight conditions (high, mid, low) or with different wind conditions or aircraft configuration flap full/flap 3, or a combination of them. The flights for the assessment should be conducted by pilots designated by the operator with defined minimum experience and qualifications, with procedures defined for the purpose.

(c) Operational assessment successful criteria

(1) Data to be recorded

To assess adequate performance of the landing system, some form of quantitative data should be recorded and reviewed with the CAA as verification of performance. Acceptable methods of data collection include but are not limited to:

(i) Record of wind conditions and touch down point (can be observation).

(ii) Record of pertinent landing system parameters (typically from a digital flight data recorder, quick-access recorder or equivalent) with sufficient sampling rate (typically higher than 1 sample per second) for the part of the flight paths of interest (typically from 300 ft height above touch down through de-rotation after touch down) including typically:

— barometric altitude;

— radio altitude;

— glide path error;

— vertical speed;

— elevator command;

— pitch attitude;

— throttle position / thrust commanded;

— airspeed;

— mode transition or engagement.

(iii) Photo or video recording of pertinent instrument or instrument and outside view allowing post-flight replay and review of the above parameters.

(2) Data review and analysis to assess acceptable performance

The final approach, flare and touch down profile should be reviewed with the CAA to ensure suitability of at least each of the following:

(i) suitability of the resulting flight path;

(ii) acceptability of any flight path deviation from the nominal path (e.g. glide path deviation, deviation from nominal flare profile);

(iii) proper mode switching;

(iv) suitable touch down point;

(v) suitable sink rate at touch down;

(vi) proper flare initiation altitude;

(vii) suitability flare quality (e.g. no evidence of early or late flare, no over-flare or under flare, no undue 'pitch down' tendency at flare initiation or during flare, no flare oscillation, no abrupt flare, no inappropriate pitch response during flare, no unacceptable floating tendency, or other unacceptable characteristic that a pilot could interpret as a failure or inappropriate response of the landing system);

(viii) no unusual flight control displacement (e.g. elevator control input spikes or oscillation);

(ix) appropriate throttle/thrust retard (e.g. no early or late retard, no failure to retard, no undue reversal of retard, no undue pitch/thrust coupling);

(x) appropriate speed decay in flare (e.g. no unusually low speed risking high pitch attitude and tail strike, no excessive float, appropriate seed decay even if well above Vref at flare initiation due to planned wind or gust compensation);

(xi) proper mode initiation or mode transition relating to altitude or radio altitude inputs (e.g. crosswind alignment).

The following GM9 SPA.LVO.110 is inserted:

GM9 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — OPERATIONAL ASSESSMENT — VERIFICATION USING AN FSTD

(a) When performing an operational assessment to determine the suitability of an aerodrome for the intended operations, the operator may replace partially or completely the approaches and landings by a verification using an FSTD, if the FSTD is suitable for the operational assessment, in accordance with point (o) of AMC1 SPA.LVO.110.
Using an FSTD to support an operational assessment can be useful when, for example, terrain criteria would qualify as 'complex' or 'very complex' (level of runway irregularities according to GM8 SPA.LVO.110).

FSTDs are usually designed with the objective of replicating the aspects relevant to the scope of flight training associated with the type and level of the FSTD qualification. FSTDs are usually not designed to be used in the context of an operational assessment of the aerodrome for the intended operations, and there may be limits to what an FSTD may be used for. It should be ensured that the capabilities of the FSTD can support the objectives of the operational assessment.

When using an FSTD, any relevant differences between the real aircraft and the FSTD should be taken into consideration. A full flight simulator (FFS) Level D certified for zero flight time training is generally the most suitable for such use.

TO APPLY A VERIFICATION USING AN FSTD, A SUITABLE FSTD SHOULD BE USED

(b) An FSTD should only be used if it is from:

(1) the same aircraft make and model, unless the same aircraft make and model is restricted by any of the entities in point (c)(2) AMC1 SPA.LVO.110; or

(2) another aircraft model, if stated in the AFM or additional data from the TC/STC holder.

The following factors should be considered:

(1) Aircraft systems

The FSTD replicates the aircraft system in regard to the configuration and behaviour of the approach system or landing system. It covers all systems that are relevant and includes — as a minimum — the guidance and control systems, the relevant displays and the automatic call-outs.

The FSTD may be composed of actual aircraft components or simulated components either by the aircraft manufacturer or by another supplier (e.g. the FSTD manufacturer). If a version or standard of a system or component differs from the aircraft, the operator verifies with the TC/STC holder whether the differences have an impact on the performance or behaviour of the approach system or landing system.

(2) Pre-threshold and runway terrain

The aircraft operator ensures that all relevant pre-threshold and runway profile data is fed into the FSTD and is representative of the real world. This could mean that additional features may need to be implemented in the terrain database of the FSTD, as the certification specifications for FSTDs require a realistic topography only for a very limited number of aerodromes.

If the pre-threshold terrain includes an artificial radio altimeter surface (ARAS), the ARAS may be verified in the FSTD, if it can be shown for this ARAS that the actual echoes of the radio altimeters can be adequately reproduced in the FSTD. This may be done by using flight data.

(3) Navigation facilities and associated instrument flight approach procedures

All relevant navigation facilities for the instrument flight approach procedures need to be adequately represented in the FSTD. It has to be taken into account that the FSTD representation of the signal in space is usually not realistic in the sense of the signal propagation and is limited to being a straight line in space, which is adequate for training purposes. Some FSTDs support, as a simulation feature for a failure case, a parallel displacement of target approach path; however, dynamic displacements (bends) or VHF noise in the signal are usually not simulated.

If the operation depends on a navigation aid, the use of the FSTD should be limited to the published service volume of the real-world navigation aid. The use of the FSTD outside this space is usually not meaningful as the signal performance and quality of the real-world navigation aid is not known.

(4) Runway environment characteristics and facilities

Whenever the flight operation relies on visual references in both natural or enhanced vision to control or monitor the flight path or to identify relevant obstacles, all relevant environment characteristics and facilities need to be suitably represented. In the case of an EFVS, the visual advantage of the system needs to be representative of the EFVS presentation in the aircraft. This could mean that additional features may need to be implemented in the visual database of the FSTD, as the certification specifications for FSTD require a realistic scenery only for a very limited number of aerodromes.

(5) Scope of FSTD verification

The minimum scope of the FSTD verification may be based on the level of runway irregularities as per GM8 SPA.LVO.110 (scaled approach).

The following GM10 SPA.LVO.110 is inserted:

GM10 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures.

SUITABLE AERODROMES — ASSESSMENT — COLLECT AND DEVELOP AIRPORT DATA NOT CONTAINED IN THE AIP — AEROPLANES

An AIP should be the primary means to collect the necessary data to perform the assessment of aerodromes for the intended operation. However, sometimes the relevant data may not be available. In that case, AMC4 SPA. LVO.110 establishes that the operator should develop procedures to collect or develop the necessary data.

In this context, the operator may use surveys and/or collected data from aeroplane sensors or data recorders. This method could be typically used to determine the pre-threshold terrain profile and partially the LSAA if not published by a State authority.

These options should be part of the LVO approval and could include, among others:

(a) data from appropriate sensors (e.g. radio altimeter, GNSS position, LOC/GS deviations);

(b) data collected from appropriate sensors stored in recorders;

(c) FDM data, if appropriate.

Sensors and data accuracy, including recorded sampling rate, should be considered in the usage of the collected data.

When defined in the approval, the respective data might be used for other airplane types.

The following GM11 SPA.LVO.110 is inserted:

GM11 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — SUITABLE INSTRUMENT APPROACH PROCEDURES (IAPs) — SA CAT I AND SA CAT II

ICAO design criteria for IAPs are contained in PANS-OPS (Doc 8168), Volume II.

The design criteria for SA CAT I are the same as those used for standard CAT I approaches, except that the procedures used for SA CAT I should have an OCH based on radio altimeter height loss, since the use of a radio altimeter or other device capable of providing equivalent performance to determine the DH is prescribed.

PANS-OPS Volume II contains the following statement about OCH based on the use of a radio altimeter: 'If the radio altimeter OCA/H is promulgated, operational checks shall have confirmed the repeatability of radio altimeter information.' To assist in assessing the suitability of the approach area for the use of a radio altimeter, aerodromes may produce a precision approach terrain chart (PATC). Such a chart is a standard requirement for CAT II/III runways. The criteria for the PATC are contained in ICAO Annex 4, which explains the function as follows: 'The chart shall provide detailed terrain profile information within a defined portion of the final approach so as to enable aircraft operating agencies to assess the effect of the terrain on DH determination by the use of radio altimeters.' A DH of 150ft is located approximately 600m before the threshold on a 3° glide path.

For SA CAT I operations, the instrument approach chart should contain an OCH based on the use of a radio altimeter or other device capable of providing equivalent performance, and the information in Part C of the operations manual must contain a DH based on the use of a radio altimeter. This procedure may be titled 'SA CAT I' or 'CAT I'.

For SA CAT II, the situation is similar. The design criteria are identical to those for CAT II approaches in PANS-OPS, the only exception being the lack of some lighting systems. The OCH and DH are based on the use of a radio altimeter or other device capable of providing equivalent performance.

Since some of the lighting systems are missing, it is unlikely that a State will publish the instrument approach chart as CAT II or OTS CAT II but preferably as SA CAT II, even though the design criteria are the same. If a State, however, promulgates such an instrument approach as CAT II, it can be used for SA CAT II operations.

SA CAT II operations can be conducted on regular CAT II runways and following CAT II procedures.

The following GM12 SPA.LVO.110 is inserted:

GM12 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS OPERATIONS

(a) EFVS operations allow operation below the DA/H without 'natural' visual reference. Obstacles may not be obvious to the crew using the EFVS and thus the approach descent slope used has to ensure that obstacle protection will be provided in the visual segment.

(b) When operating below the DA/H, pilots rely on the EFVS and, for EFVS-A operations, the pilot flying will need to acquire 'natural' visual reference at some point prior to touchdown (typically 100 ft above the threshold elevation). EFVS operations may present a higher probability of initiating a go-around below the DA/H than non-EFVS operations, depending on the equipment used.

(c) The purpose of the assessment of the suitability of aerodromes of Instrument Approach Procedures (IAPs) is to confirm that clearance from terrain and obstacles will be available at every stage of the approach including the visual segment and, in the event of a go-around initiated below the DH, the missed approach segment. The assessment of the visual segment should be done with reference to the visual segment surface (VSS).

(d) If a runway and an approach has been promulgated as suitable for EFVS operations, it may be assumed that the required obstacle clearance for the instrument segment and obstacle protection for the visual segment is assured and that the lighting systems are suitable. For EFVS-L operations, the pre-threshold terrain and LSAA need to be evaluated with regard to the function of flare cues or flare commands. Additionally, for runways not promulgated as suitable for EFVS operations, the operator may include the switch-over time for electrical power supply for the approach or runway lights in the safety assessment.

(e) US TERPS and ICAO Doc 9905 'Required Navigation Performance Authorisation Required (RNP AR) Procedure Design Manual' describe procedure design criteria that may be considered equivalent to PANS-OPS.

(f) Procedures not designed in accordance with PANS-OPS may have not been assessed for obstacle protection below the OCH and may not provide a clear vertical path to the runway at the normal descent angle. IAPs do not ensure obstacle clearance if a go-around is initiated below the DA/H. If an obstacle free zone (OFZ) is established, obstacle protection is provided for the go-around manoeuvre.

(g) For approach procedures where obstacle protection is not assured for a balked landing, operational procedures available to the operator could include one or more of the following actions:

(1) require that a go-around should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by a height above the threshold that will ensure that obstacle protection. This height might be greater than 100 ft or the height below which an approach should not be continued if the flight crew does not acquire natural visual reference as stated in the AFM;

(2) develop an alternative lateral profile to be followed in the event of a go-around below the DA/H;

(3) impose an aircraft mass restriction for EFVS operations so that the aircraft can achieve a sufficient missed approach climb performance to clear any obstacles in the missed approach segment if a go-around is initiated at any point prior to touchdown.

(h) The terrain/obstacle clearance required in the missed approach phase for EFVS operations should be no less than for the same approach flown without EFVS.

(i) Certain EFVSs may have additional requirements for the suitability of the runways to be used. These could include verification of the accuracy of charting information for the runway threshold or the type of approach lighting installed (incandescent or LED). The assessment of the suitability of aerodromes should include the verification that all such requirements can be satisfied before EFVS operations are authorised for a particular runway.

(j) In completing the aerodrome suitability assessment consideration should be given to the specific configuration of incandescent lights and LED lights in the following areas: approach lights, runway threshold lights, runway edge lights, and (if applicable) threshold identification lights, centreline lights, wing bar lights, aerodrome obstacle lighting, supplementary approach lights and touch down zone lights. The aim of the assessment is to ensure that the aerodrome lighting is compatible with EFVS equipment used by the operator.

AMC1 SPA.LVO.120 is deleted:

~~AMC1 SPA.LVO.120 Flight crew training and qualifications~~

~~**GENERAL PROVISIONS**~~

~~(a) The operator should ensure that flight crew member training programmes for LVO include structured courses of ground, FSTD and/or flight training.~~

~~(1) Flight crew members with no CAT II or CAT III experience should complete the full training programme prescribed in (b), (c), and (d) below.~~

~~(2) Flight crew members with CAT II or CAT III experience with a similar type of operation (auto-coupled/auto-land, HUDLS/hybrid HUDLS or EVS) or CAT II with manual land, if appropriate, with another EU operator may undertake an:~~

~~(i) abbreviated ground training course if operating a different type or class from that on which the previous CAT II or CAT III experience was gained;~~

~~(ii) abbreviated ground, FSTD and/or flight training course if operating the same type or class and variant of the same type or class on which the previous CAT II or CAT III experience was gained. The abbreviated course should include at least the provisions of (d)(1), (d)(2)(i) or (d)(2)(ii) as appropriate and (d)(3)(i). The operator may reduce the number of approaches/landings required by (d)(2)(i) if the type/class or the variant of the type or class has the same or similar:~~

~~(A) level of technology - flight control/guidance system (FGS);~~

~~(B) operating procedures;~~

~~(C) handling characteristics;~~

~~(D) use of HUDLS/hybrid HUDLS; and~~

~~(E) use of EVS,~~

~~as the previously operated type or class, otherwise the provisions of (d)(2)(i) should be met.~~

~~(3) Flight crew members with CAT II or CAT III experience with the operator may undertake an abbreviated ground, FSTD and/or flight training course.~~

~~(i) When changing aircraft type or class, the abbreviated course should include at least the provisions of (d)(1), (d)(2)(i) or (d)(2)(ii) as appropriate and (d)(3)(i).~~

~~(ii) When changing to a different variant of aircraft within the same type or class rating that has the same or similar:~~

~~(A) level of technology - FGS;~~

~~(B) operating procedures - integrity;~~

~~(C) handling characteristics;~~

~~(D) use of HUDLS/Hybrid HUDLS; and~~

~~(E) use of EVS,~~

~~as the previously operated type or class, a difference course or familiarisation appropriate to the change of variant should fulfil the abbreviated course provisions.~~

~~(iii) When changing to a different variant of aircraft within the same type or class rating that has a significantly different:~~

(A) level of technology - FGS;

(B) operating procedures - integrity;

(C) handling characteristics;

(D) use of HUDLS/Hybrid HUDLS; or

(E) use of EVS,

the provisions of (d)(1), (d)(2)(i) or (d)(2)(ii) as appropriate and (d)(3)(i) should be fulfilled.

(4) The operator should ensure when undertaking CAT II or CAT III operations with different variant(s) of aircraft within the same type or class rating that the differences and/or similarities of the aircraft concerned justify such operations, taking into account at least the following:

(i) the level of technology, including the:

(A) FGS and associated displays and controls;

(B) FMS and its integration or not with the FGS; and

(C) use of HUD/HUDLS with hybrid systems and/or EVS;

(ii) operating procedures, including:

(A) fail-passive / fail-operational, alert height;

(B) manual landing / automatic landing;

(C) no DH operations; and

(D) use of HUD/HUDLS with hybrid systems;

(iii) handling characteristics, including:

(A) manual landing from automatic HUDLS and/or EVS guided approach;

(B) manual missed approach procedure from automatic approach; and

(C) automatic/manual rollout.

GROUND TRAINING

(b) The initial ground training course for LVO should include at least the following:

(1) characteristics and limitations of the ILS and/or MLS;

(2) characteristics of the visual aids;

(3) characteristics of fog;

(4) operational capabilities and limitations of the particular airborne system to include HUD symbology and EVS characteristics, if appropriate;

(5) effects of precipitation, ice accretion, low level wind shear and turbulence;

(6) effect of specific aircraft/system malfunctions;

(7) use and limitations of RVR assessment systems;

(8) principles of obstacle clearance requirements;

(9) recognition of and action to be taken in the event of failure of ground equipment;

(10) procedures and precautions to be followed with regard to surface movement during operations when the RVR is 400 m or less and any additional procedures required for take-off in conditions below 150 m;

(11) significance of DHs based upon radio altimeters and the effect of terrain profile in the

approach area on radio altimeter readings and on the automatic approach/landing systems;

(12) importance and significance of alert height, if applicable, and the action in the event of any failure above and below the alert height;

(13) qualification requirements for pilots to obtain and retain approval to conduct LVOs; and

(14) importance of correct seating and eye position.

FSTD TRAINING AND/OR FLIGHT TRAINING

(c) FSTD training and/or flight training

(1) FSTD and/or flight training for LVO should include at least:

(i) checks of satisfactory functioning of equipment, both on the ground and in flight;

(ii) effect on minima caused by changes in the status of ground installations;

(iii) monitoring of:

(A) 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

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

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

(v) the effect of known unserviceabilities and use of MELs;

(vi) operating limitations resulting from airworthiness certification;

(vii) guidance on the visual cues required at DH together with information on maximum deviation allowed from glide path or localiser; and

(viii) the importance and significance of alert height if applicable and the action in the event of any failure above and below the alert height.

(2) Flight crew members should be trained to carry out their duties and instructed on the coordination required with other crew members. Maximum use should be made of suitably equipped FSTDs for this purpose.

(3) Training should be divided into phases covering normal operation with no aircraft or equipment failures but including all weather conditions that may be encountered and detailed scenarios of aircraft and equipment failure that could affect CAT II or III operations. If the aircraft system involves the use of hybrid or other special systems, such as HUD/HUDLS or enhanced vision equipment, then flight crew members should practice the use of these systems in normal and abnormal modes during the FSTD phase of training.

(4) Incapacitation procedures appropriate to LVTO, CAT II and CAT III operations should be practiced.

(5) For aircraft with no FSTD available to represent that specific aircraft, operators should ensure that the flight training phase specific to the visual scenarios of CAT II operations is conducted in a specifically approved FSTD. Such training should include a minimum of four approaches. Thereafter, the training and procedures that are type specific should be practiced in the aircraft.

(6) Initial CAT II and III training should include at least the following exercises:

(i) approach using the appropriate flight guidance, autopilots and control systems installed in the aircraft, to the appropriate DH and to include transition to visual flight and landing;

(ii) 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 DH followed by missed approach - all without external visual reference;

(iii) where appropriate, approaches utilising automatic flight systems to provide automatic flare, hover, landing and rollout; and

(iv) normal operation of the applicable system both with and without acquisition of visual cues at DH.

(7) Subsequent phases of training should include at least:

(i) approaches with engine failure at various stages on the approach;

(ii) approaches with critical equipment failures, such as electrical systems, auto flight systems, ground and/or airborne ILS, MLS systems and status monitors;

(iii) approaches where failures of auto flight equipment and/or HUD/HUDLS/EVS at low level require either:

(A) reversion to manual flight to control flare, hover, landing and rollout or missed approach; or

(B) reversion to manual flight or a downgraded automatic mode to control missed approaches from, at or below DH including those which may result in a touchdown on the runway;

(iv) failures of the systems that will result in excessive localiser and/or glideslope deviation, both above and below DH, in the minimum visual conditions specified 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

(v) failures and procedures specific to aircraft type or variant.

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

(9) The training programme should include the handling of the aircraft when, during a fail-passive CAT III approach, the fault causes the autopilot to disconnect at or below DH when the last reported RVR is 300 m or less.

(10) Where take-offs are conducted in RVRs of 400 m and below, training should be established to cover systems failures and engine failure resulting in continued as well as rejected take-offs.

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

(i) reversion to head down displays to control missed approach; or

(ii) reversion to flight with no, or downgraded, HUDLS guidance to control missed approaches from DH or below, including those which may result in a touchdown on the runway.

(12) When undertaking LVTO, LTS CAT I, OTS CAT II, CAT II and CAT III operations utilising a HUD/HUDLS, hybrid HUD/HUDLS or an EVS, the training and checking programme should include, where appropriate, the use of the HUD/HUDLS in normal operations during all phases of flight.

CONVERSION TRAINING

(d) Flight crew members should complete the following low visibility procedures (LVPs) training if converting to a new type or class or variant of aircraft in which LVTO, LTS CAT I, OTS CAT II, approach operations utilising EVS with an RVR of 800 m or less and CAT II and CAT III operations will be conducted. Conditions for abbreviated courses are prescribed in (a)(2), (a)(3) and (a)(4).

(1) Ground training

The appropriate provisions are as prescribed in (b), taking into account the flight crew member's CAT II and CAT III training and experience.

(2) FSTD training and/or flight training

(i) A minimum of six, respectively eight for HUDLS with or without EVS, approaches and/or landings in an FSTD. The provisions for eight HUDLS approaches may be reduced to six when conducting hybrid HUDLS operations.

(ii) Where no FSTD is available to represent that specific aircraft, a minimum of three, respectively five for HUDLS and/or EVS, approaches including at least one missed approach procedure is required on the aircraft. For hybrid HUDLS operations a minimum of three approaches is required, including at least one missed approach procedure.

(iii) Appropriate additional training if any special equipment is required such as head-up displays or enhanced vision equipment. When approach operations utilising EVS are conducted with an RVR of less than 800 m, a minimum of five approaches, including at least one missed approach procedure are required on the aircraft.

(3) Flight crew qualification

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

(i) The operator should ensure that each flight crew member completes a check before conducting CAT II or III operations.

(ii) The check specified in (d)(3)(i) may be replaced by successful completion of the FSTD and/or flight training specified in (d)(2).

(4) Line flying under supervision

Flight crew member should undergo the following line flying under supervision (LIFUS):

(i) For CAT II when a manual landing or a HUDLS approach to touchdown is required, a minimum of:

(A) three landings from autopilot disconnect; and

(B) four landings with HUDLS used to touchdown,

except that only one manual landing, respectively two using HUDLS, to touchdown is required when the training required in (d)(2) has been carried out in an FSTD qualified for zero flight time conversion.

(ii) For CAT III, a minimum of two auto-lands, except that:

(A) only one auto-land is required when the training required in (d)(2) has been carried out in an FSTD qualified for zero flight time conversion;

(B) no auto-land is required during LIFUS when the training required in (d)(2) has been carried out in an FSTD qualified for zero flight time (ZFT) conversion and the flight crew member successfully completed the ZFT type rating conversion course; and

(C) the flight crew member, trained and qualified in accordance with (B), is qualified to operate during the conduct of LIFUS to the lowest approved DA/H and RVR as stipulated in the operations manual.

(iii) For CAT III approaches using HUDLS to touchdown, a minimum of four approaches.

TYPE AND COMMAND EXPERIENCE

(e) Type and command experience

(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:

(i) 50 hours or 20 sectors on the type, including LIFUS; and

(ii) 100 m should be added to the applicable CAT II RVR minima when the operation requires a CAT II manual landing or use of HUDLS to touchdown until:

(A) a total of 100 hours or 40 sectors, including LIFUS, has been achieved on the type; or

(B) a total of 50 hours or 20 sectors, including LIFUS, has been achieved on the type where the flight crew member has been previously qualified for CAT II manual landing operations with an EU operator;

(C) for HUDLS operations the sector provisions in (e)(1) and (e)(2)(i) should always be applicable; the hours on type or class do not fulfil the provisions.

(2) Before commencing CAT III 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:

(i) 50 hours or 20 sectors on the type, including LIFUS; and

(ii) 100 m should be added to the applicable CAT II or CAT III RVR minima unless he/she has previously qualified for CAT II or III operations with an EU operator, until a total of 100 hours or 40 sectors, including LIFUS, has been achieved on the type.

RECURRENT TRAINING AND CHECKING

(f) Recurrent training and checking – LVO

(1) The operator should ensure that, in conjunction with the normal recurrent training and operator’s proficiency checks, the pilot's knowledge and ability to perform the tasks associated with the particular category of operation, for which the pilot is authorised by the operator, are checked. The required number of approaches to be undertaken in the FSTD within the validity period of the operator’s proficiency check should be a minimum of two, respectively four when HUDLS and/or EVS is utilised to touchdown, one of which should be a landing at the lowest approved RVR. In addition one, respectively two for HUDLS and/or operations utilising EVS, of these approaches may be substituted by an approach and landing in the aircraft using approved CAT II and CAT III procedures. One missed approach should be flown during the conduct of an operator proficiency check. If the operator is approved to conduct take-off with RVR less than 150 m, at least one LVTO to the lowest applicable minima should be flown during the conduct of the operator’s proficiency check.

(2) For CAT III operations the operator should use an FSTD approved for this purpose.

(3) For CAT III operations on aircraft with a fail-passive flight control system, including HUDLS, a missed approach should be completed by each flight crew member at least once over the period of three consecutive operator proficiency checks as the result of an autopilot failure at or below DH when the last reported RVR was 300 m or less.

LVTO OPERATIONS

(g) LVTO with RVR less than 400 m

(1) Prior to conducting take-offs in RVRs below 400 m, the flight crew should undergo the following training:

(i) normal take-off in minimum approved RVR conditions;

(ii) take-off in minimum approved RVR conditions with an engine failure:

(A) for aeroplanes between V_1 and V_2 (take-off safety speed), or as soon as safety considerations permit;

(B) for helicopters at or after take-off decision point (TDP); and

(iii) take-off in minimum approved RVR conditions with an engine failure:

(A) for aeroplanes before V_1 resulting in a rejected take-off; and

(B) for helicopters before the TDP.

(2) The operator approved for LVTOs with an RVR below 150 m should ensure that the training specified by (g)(1) is carried out in an FSTD. This training should include the use of any special procedures and equipment.

(3) The operator should ensure that a flight crew member has completed a check before conducting LVTO in RVRs of less than 150 m. The check may be replaced by successful completion of the FSTD and/or flight training prescribed in (g)(1) on conversion to an aircraft type.

LTS CAT I, OTS CAT II, OPERATIONS UTILISING EVS

(h) Additional training provisions

(1) General

Operators conducting LTS CAT I operations, OTS CAT II operations and operations utilising EVS with RVR of 800 m or less should comply with the provisions applicable to CAT II operations and include the provisions applicable to HUDLS, if appropriate. The operator may combine these additional provisions where appropriate provided that the operational procedures are compatible.

(2) LTS CAT I

During conversion training the total number of approaches should not be additional to the requirements of Subpart FC of Annex III (ORO.FC) provided the training is conducted utilising the lowest applicable RVR. During recurrent training and checking the operator may also combine the separate requirements provided the above operational procedure provision is met and at least one approach using LTS CAT I minima is conducted at least once every 18 months.

(3) OTS CAT II

During conversion training the total number of approaches should not be less than those to complete CAT II training utilising a HUD/HUDLS. During recurrent training and checking

the operator may also combine the separate provisions provided the above operational procedure provision is met and at least one approach using OTS CAT II minima is conducted at least once every 18 months.

(4) Operations utilising EVS with RVR of 800 m or less

During conversion training the total number of approaches required should not be less than that required to complete CAT II training utilising a HUD. During recurrent training

~~and checking the operator may also combine the separate provisions provided the above operational procedure provision is met and at least one approach utilising EVS is conducted at least once every 12 months.~~

GM1 SPA.LVO.120 is deleted:

~~GM1 SPA.LVO.120 Flight crew training and qualifications~~

~~**FLIGHT CREW TRAINING**~~

~~The number of approaches referred to in **AMC1 SPA.LVO.120(g)(1)** includes one approach and landing that may be conducted in the aircraft using approved CAT II/III procedures. This approach and landing may be conducted in normal line operation or as a training flight.~~

The following AMC1 SPA.LVO.120(a) is inserted:

AMC1 SPA.LVO.120(a) Flight crew competence

COMPETENCE OF THE FLIGHT CREW FOR THE INTENDED OPERATIONS — EXPERIENCE IN TYPE OR CLASS, OR AS PILOT-IN-COMMAND/COMMANDER

To ensure that the flight crew is competent to conduct the intended operations, the operator should assess the risks associated with the conduct of low-visibility approach operations by pilots new to the aircraft type or class and take the necessary mitigations. Where such mitigations include an increment to the visibility or RVR for LVOs, this should be stated in the operations manual.

The following AMC2 SPA.LVO.120(a) is inserted:

AMC2 SPA.LVO.120(a) Flight crew competence

COMPETENCE OF THE FLIGHT CREW FOR THE INTENDED OPERATIONS — RECENT EXPERIENCE FOR EFVS OPERATIONS

To be considered competent to conduct EFVS operations:

(a) Pilots should complete a minimum of two approaches on each type of aircraft operated using the operator's procedures for EFVS operations during the validity period of each operator proficiency check or periodic demonstration of competence unless credits related to recent experience when operating more than one type are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012. When the operator is approved for both EFVS-L and EFVS-A, a minimum of one approach in each EFVS operation should be completed.

(b) If a flight crew member is authorised to operate as pilot flying and pilot monitoring during EFVS operations, the flight crew member should complete the required number of approaches in each operating capacity.

The following AMC3 SPA.LVO.120(a) is inserted:

AMC3 SPA.LVO.120(a)Flight crew competence

COMPETENCE OF THE FLIGHT CREW FOR THE INTENDED OPERATIONS — RECENT EXPERIENCE FOR SA CAT I, CAT II, SA CAT II AND CAT III APPROACH OPERATIONS

To be considered competent:

(a) Pilots authorised to conduct low-visibility approach operations or operations with operational credits should complete at least two approaches using the operator's procedures for low-visibility approach operations or operations with operational credits, during the validity period of each operator proficiency check or periodic demonstration of competence, unless credits related to recent experience when operating more than one type are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

(b) If the operator is approved for more than one piece of aircraft equipment used (e.g. autoland, HUD, auto-coupled approach with manual landing, SVGS, etc.), pilots should complete at least one additional approach in the lowest approved RVR (either to go-around or landing) for each piece of aircraft equipment used during the validity period of each operator proficiency check or periodic demonstration of competence (e.g. two approaches CAT II with autoland and one CAT II with auto-coupled to below DH with manual landing, two CAT II autoland and one CAT II HUD to below DH with manual landing or vice versa) unless credits related to recent experience when operating more than one type are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

(c) Pilots authorised to conduct low-visibility approach operations or operations with operational credits using HUDLS or equivalent display systems to touchdown should complete two approaches (e.g. an operator approved for CAT II/III HUDLS will do two CAT III HUDLS; other examples would be two CAT III autoland and two CAT III HUDLS to touchdown, two SA CAT II autoland and two SA CAT II HUDLS, or when combining several LVOs and equipment, two CAT III autoland and one CAT II auto-coupled to below DH with manual landing and two CAT III HUDLS to touchdown) using the operator's procedures for low-visibility approach operations or operations with operational credits using HUDLS, during the validity period of each operator proficiency check or periodic demonstration of competence unless credits related to recent experience when operating more than one type are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

(d) If a flight crew member is authorised to operate as pilot flying and pilot monitoring, the flight crew member should complete the required number of approaches in each operating capacity.

The following GM1 SPA.LVO.120(a) is inserted:

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

COMPETENCE OF THE FLIGHT CREW FOR THE INTENDED OPERATIONS — EXPERIENCE IN TYPE OR CLASS, OR AS PILOT-IN-COMMAND/COMMANDER

As general guidance, the operator may use the following reference to assess the experience in type or class or as pilot-in-command/commander referred to in AMC1 SPA.LVO.120(a):

(a) Before commencing CAT II operations, the following guidance applies to pilots-in-command/commanders or pilots to whom conduct of the flight may be delegated, who are new to the aircraft type:

(1) 50 hours or 20 sectors on the type, including LIFUS; and

(2) 100 m should be added to the applicable CAT II RVR minima when the operation requires a CAT II manual landing to touchdown until:

(i) a total of 100 hours or 40 sectors, including LIFUS, has been achieved on the type; or

(ii) a total of 50 hours or 20 sectors, including LIFUS, has been achieved on the type where the flight crew member has been previously qualified for CAT II manual landing operations with a UK operator;

(3) 100m should be added to the applicable CAT II RVR minima when the operation requires the use of CAT II HUDLS to touchdown until:

(i) a total of 40 sectors, including LIFUS, has been achieved on the type; or

(ii) a total of 20 sectors, including LIFUS, has been achieved on the type where the flight crew member has been previously qualified for CAT II HUDLS to touchdown with a UK operator.

The sector provision in point (a)(1) may always be applicable; the hours on type or class may not fulfil the provisions.

(b) Before commencing CAT III operations, the following additional provisions may apply to pilots-in-command/commanders or pilots to whom conduct of the flight may be delegated, who are new to the aircraft type:

(1) 50 hours or 20 sectors on the type, including LIFUS; and

(2) 100m should be added to the applicable CAT II or CAT III RVR minima unless they have been previously qualified for CAT II or III operations with a UK operator, until a total of 100 hours or 40 sectors, including LIFUS, has been achieved on the type.

The following AMC1 SPA.LVO.120(b) is inserted:

AMC1 SPA.LVO.120(b) Flight crew competence

INITIAL TRAINING FOR LVTO IN AN RVR LESS THAN 400M

The operator should ensure that the flight crew members have completed the following training and checking prior to being authorised to conduct take-offs in an RVR below 400m unless credits related to training and checking for previous experience in LVTOs on similar aircraft types are defined in the operational suitability data established in accordance with UK Regulation (EU) No748/2012:

(a) A ground training course including at least the following:

(1) characteristics of fog;

(2) effects of precipitation, ice accretion, low-level wind shear and turbulence;

(3) the effect of specific aircraft/system malfunctions;

(4) the use and limitations of RVR assessment systems;

(5) procedures to be followed and precautions to be taken with regard to surface movement during operations when the RVR is 400m or less and any additional procedures required for take-off in conditions below 150m;

(6) qualification requirements for pilots to obtain and retain approval to conduct LVOs; and

(7) the importance of correct seating and eye position.

(b) A course of FSTD/flight training covering system failures and engine failures resulting in continued as well as rejected take-offs. Such training should include at least:

(1) normal take-off in minimum approved RVR conditions;

(2) take-off in minimum approved RVR conditions with an engine failure:

(i) for aeroplanes, between V_1 and V_2 (take-off safety speed) or as soon as safety considerations permit;

(ii) for helicopters, at or after the take-off decision point (TDP); and

(3) take-off in minimum approved RVR conditions with an engine failure:

(i) for aeroplanes, before V_1 resulting in a rejected take-off; and

(ii) for helicopters, before the TDP.

(c) The operator approved for LVTOs with an RVR below 150 m should ensure that the training specified in (b) is carried out in an FSTD. This training should include the use of any special procedures and equipment.

(d) The operator should ensure that a flight crew member has completed a check, carried out in an FSTD, before conducting LVTOs in RVRs of less than 150m. The check should require the execution of:

(1) at least one LVTO in the minimum approved visibility;

(2) at least one rejected take-off at minimum approved RVR.

For pilots with previous experience with an EU operator of LVTOs in RVRs of less than 150 m, the check may be replaced by successful completion of the FSTD and/or flight training specified in (a), (b) and (c).

The following AMC2 SPA.LVO.120(b) is inserted:

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

INITIAL TRAINING AND CHECKING FOR SA CAT I, CAT II, SA CAT II AND CAT III APPROACH OPERATIONS

Operators should ensure that flight crew members complete the following training and checking before being authorised to conduct SA CAT I, CAT II, SA CAT II and CAT III approach operations unless credits related to training and checking for previous experience on similar aircraft types are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012:

(a) For flight crew members who do not have previous experience of low-visibility approach operations requiring an approval under this Subpart with a UK operator:

(1) A course of ground training including at least the following:

(i) characteristics and limitations of different types of approach aids;

(ii) characteristics of the visual aids;

(iii) characteristics of fog;

(iv) operational capabilities and limitations of airborne systems to include symbology used on HUD/HUDLS or equivalent display systems, if appropriate;

(v) effects of precipitation, ice accretion, low level wind shear and turbulence;

(vi) the effect of specific aircraft/system malfunctions;

(vii) the use and limitations of RVR assessment systems;

(viii) principles of obstacle clearance requirements;

(ix) the recognition of failure of ground equipment or in satellite approaches, the loss of signal in space and the action to be taken in the event of such failures;

(x) procedures to be followed and precautions to be taken with regard to surface movement during operations when the RVR is 400 m or less and any additional procedures required for take-off in conditions below 150 m;

(xi) the significance of DHs based upon radio altimeters and the effect of terrain profile in the approach area on radio altimeter readings and on automatic approach/landing systems. This applies also to other devices capable of providing equivalent information;

(xii) the effect of the pre-threshold terrain and LSAA on airborne landing systems;

(xiii) the significance of alert height, if applicable, and action in the event of any failure above and below the alert height;

(xiv) qualification requirements for pilots to obtain and retain approval to conduct LVOs;

(xv) the importance of correct seating and eye position; and

(xvi) the significance of LVPs or equivalent procedures.

(2) A course of FSTD training and/or flight training in two phases as follows:

(i) Phase one (LVOs with aircraft and all equipment serviceable) — objectives

(A) understand the operation of equipment required for LVOs;

(B) understand the operating limitations resulting from airworthiness certification;

(C) practice the monitoring of automatic flight control systems and status annunciators;

(D) practice the use of HUD/HUDLS or equivalent display systems, where appropriate;

(E) understand the significance of alert height, if applicable;

(F) become familiar with the maximum lateral and vertical deviation permitted for different types of approach operation;

(G) become familiar with the visual references required at DH;

(H) master the manual aircraft handling relevant to low-visibility approach operations;

(I) practice coordination with other crew members; and

(J) become proficient at procedures for low-visibility approach operations with serviceable equipment.

(ii) Phase one of the training should include the following exercises:

(A) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

(B) the use of HUD/HUDLS or equivalent display systems during all phases of flight, if applicable;

(C) approach using the appropriate flight guidance, autopilots, and control systems installed on the aircraft to the appropriate DH and transition to visual flight and landing;

(D) approach with all engines operating using the appropriate flight guidance, autopilots and control systems installed on the aircraft, including HUD/HUDLS or equivalent display systems, down to the appropriate DH followed by a missed approach, all without external visual reference;

(E) where appropriate, approaches using autopilot to provide automatic flare, hover, landing and roll-out; and

(F) where appropriate, approaches using approved HUD/HUDLS or equivalent display system to touchdown.

(iii) Phase two (low-visibility approach operations with aircraft and equipment failures and degradations) — objectives

(A) understand the effect of known aircraft unserviceability including use of the MEL;

(B) understand the effect of failed or downgraded equipment on aerodrome operating minima;

(C) understand the actions required in response to failures and changes in the status of automatic flight control/guidance systems including HUD/HUDLS or equivalent display systems;

(D) understand the actions required in response to failures above and below alert height, if applicable;

(E) practice abnormal operations and incapacitation procedures; and

(F) become proficient at dealing with failures and abnormal situations during low-visibility approach operations.

(iv) Phase two of the training should include the following exercises:

(A) approaches with engine failures at various stages of the approach;

(B) approaches with critical equipment failures, such as electrical systems, auto-flight systems, ground or airborne approach aids and status monitors;

(C) approaches where failures of auto-flight or flight guidance systems, including HUDLS or equivalent display systems, require either:

(a) reversion to manual control for landing or go-around; or

(b) reversion to manual control or a downgraded automatic mode control for go-around from the DH or below, including those which may result in contact with the runway.

This should include aircraft handling if, during a CAT III fail-passive approach, a fault causes autopilot to disconnect at or below the DH when the last reported RVR is 300m or less;

(D) failures of systems that will result in excessive lateral or vertical deviation both above and below the DH in the minimum visual conditions for the operation;

(E) incapacitation procedures appropriate to low-visibility approach operations; and

(F) failures and procedures applicable to the specific aircraft type.

(v) FSTD training should include:

(A) for approaches flown using HUDLS or equivalent display systems, a minimum of eight approaches;

(B) otherwise, a minimum of six approaches.

(vi) For aircraft for which no FSTDs representing the specific aircraft are available, operators should ensure that the flight training phase specific to the visual scenarios of low-visibility approach operations is conducted in a specifically approved FSTD. Such training should include a minimum of four approaches. Thereafter, type-specific training should be conducted in the aircraft.

(3) A check requiring the completion of at least the following exercises in an aircraft or FSTD

(i) Low-visibility approaches in simulated instrument flight conditions down to the applicable DH, using the flight guidance system. Standard procedures of crew coordination (task sharing, call-out procedures, mutual surveillance, information exchange and support) should be observed. For CAT III operations, the operator should use an FSTD approved for this purpose;

(ii) Go-around after approaches as indicated in (2) at any point between 500ft above ground level (AGL) and on reaching the DH; and

(iii) Landing(s) with visual reference established at the DH following an instrument approach. Depending on the specific flight guidance system, an automatic landing should be performed.

(4) For operators for which LIFUS is required by Part-ORO, practice in approaches during LIFUS, as follows:

(i) For low-visibility approach operations using a manual landing:

(A) if a HUDLS or equivalent display system is used to touchdown, four landings, or if the training required by (a)(2) was conducted in an FSTD qualified for zero flight-time training (ZFTT), two landings;

(B) otherwise, three landings, or if the training required by (a)(2) was conducted in an FSTD qualified for ZFTT, one landing;

(ii) For low-visibility operations using autoland:

(A) if the training required by (a)(2) was conducted in an FSTD qualified for ZFTT, one landing, or none if the fight crew member successfully completed a type rating based on ZFTT;

(B) otherwise, two landings.

(b) For flight crew members who have previous experience of low-visibility approach operations requiring an approval under this Subpart with a UK operator, when changing to an aircraft for which a new class or type rating is required, within the same operator:

(1) A course of ground training as specified in (a)(1), taking into account the flight crew member's existing knowledge of low-visibility approach operations.

(2) A course of FSTD and/or flight training, as specified in (a)(2) above. If the flight crew member's previous experience of low-visibility approach operations is on a type where the following were the same or similar:

(i) the technology used in the flight guidance and flight control system;

(ii) operating procedures;

(iii) handling characteristics; and

(iv) the use of HUD/HUDLS or equivalent display systems,

then the flight crew member may complete an abbreviated course of FSTD and/or flight training.

(3) An abbreviated course should meet the objectives described in (a)(2),it does not need to include the number of approaches required by (a)(2)(v), but should include at least the following number of landings:

(i) if a HUDLS or an equivalent display system is utilised to touchdown, then four approaches including a landing at the lowest approved RVR and a go-around; or

(ii) otherwise, two approaches including a landing at the lowest approved RVR and a go-around.

(c) For flight crew members who have previous experience of low-visibility approach operations requiring an approval under this Subpart with a UK operator, when joining another operator:

(1) A course of ground training as specified in (a)(1), taking into account the flight crew member's existing knowledge of low-visibility approach operations.

(2) A course of FSTD and/or flight training as specified in (a)(2) above. If the flight crew member's previous experience of low-visibility approach operations is on the same aircraft type and variant, or on a different type or variant where the following were the same or similar:

(i) the technology used in the flight guidance and flight control system;

(ii) operating procedures;

(iii) handling characteristics; and

(iv) the use of HUD/HUDLS or equivalent display systems,

then the flight crew member may complete an abbreviated course of FSTD and/or flight training. Such an abbreviated course should meet the objectives described in (a)(2), it does not need to include the number of approaches required by (a)(2)(v), but should include at least the following number of landings:

(A) if a HUDLS or an equivalent display system is utilised to touchdown, then four approaches including a landing at the lowest approved RVR and a go-around; or

(B) otherwise, two approaches including a landing at the lowest approved RVR and a go-around.

(3) Practice in approaches during LIFUS as required by (a)(3) above unless the flight crew member's previous experience of low-visibility approach operations is on the same aircraft type and variant.

The following AMC3 SPA.LVO.120(b) is inserted:

AMC3 SPA.LVO.120(b) Flight crew competence

INITIAL TRAINING AND CHECKING FOR EFVS OPERATIONS

Operators should ensure that flight crew members complete the following training and checking before being authorised to conduct EFVS operations unless credits related to training and checking for previous experience on similar aircraft types are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012:

(a) For flight crew members who do not have previous experience of EFVS operations requiring an approval under this Subpart with a UK operator:

(1) A course of ground training including at least the following:

(i) characteristics and limitations of HUDs/HUDLSs or equivalent display systems including information presentation and symbology;

(ii) EFVS sensor type, spectral sensitivity and limitations, sensor performance and the effects of scene temperature and absolute humidity, , scene interpretation, visual anomalies and other visual effects;

(iii) EFVS display, control, modes, features, symbology, annunciations and associated systems and components;

(iv) the interpretation of EFVS imagery;

(v) the interpretation of approach and runway lighting systems and display characteristics when using EFVS;

(vi) weather associated with low-visibility conditions and its effect on EFVS performance;

(vii) pre-flight planning and selection of suitable aerodromes and approach procedures;

(viii) principles of obstacle clearance requirements;

(ix) the use and limitations of RVR assessment systems;

(x) normal, abnormal and emergency procedures for EFVS operations;

(xi) the effect of specific aircraft/system malfunctions;

(xii) procedures to be followed and precautions to be taken with regard to surface movement during operations when the RVR is 400 m or less;

(xiii) for EFVS-L, the effect of the pre-threshold terrain and LSAA on airborne landing systems;

(xiv) human factors aspects of EFVS operations;

(xv) qualification requirements for pilots to obtain and retain approval for EFVS operations; and

(xvi) the significance of LVPs or equivalent procedures when operating below RVR 550 m.

(2) A course of FSTD training and/or flight training in two phases as follows:

(i) Phase one (EFVS operations with aircraft and all equipment serviceable) — objectives:

(A) understand the operation of equipment required for EFVS operations;

(B) understand operating limitations of the installed EFVS;

(C) practice the use of HUD/HUDLS or equivalent display systems;

(D) practice the set-up and adjustment of EFVS equipment in different conditions (e.g. day and night);

(E) practice the monitoring of automatic flight control systems, EFVS information and status annunciators;

(F) practice the interpretation of EFVS imagery;

(G) become familiar with the features needed on the EFVS image to continue approach below the DH;

(H) practice the identification of visual references using natural vision while using EFVS equipment;

(I) master the manual aircraft handling relevant to EFVS operations including, where appropriate, the use of the flare cue and guidance for landing;

(J) practice coordination with other crew members; and

(K) become proficient at procedures for EFVS operations.

(ii) Phase one of the training should include the following exercises:

(A) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

(B) the use of HUD/HUDLS or equivalent display systems during all phases of flight;

(C) approach using the EFVSs installed on the aircraft to the appropriate DH and transition to visual flight and landing;

(D) approach with all engines operating using the EFVS, down to the appropriate DH followed by a missed approach, all without external visual reference;

(E) where appropriate, approaches using approved EFVS to touchdown.

(iii) Phase two (EFVS operations with aircraft and equipment failures and degradations) — objectives:

(A) understand the effect of known aircraft unserviceabilities including use of the MEL;

(B) understand the effect of failed or downgraded equipment on aerodrome operating minima;

(C) understand the actions required in response to failures and changes in the status of the EFVS including HUD/HUDLS or equivalent display systems;

(D) understand the actions required in response to failures above and below the DH;

(E) practice abnormal operations and incapacitation procedures; and

(F) become proficient at dealing with failures and abnormal situations during EFVS operations.

(iv) Phase two of the training should include the following exercises:

(A) approaches with engine failures at various stages of the approach;

(B) approaches with failures of the EFVS at various stages of the approach, including failures between the DH and the height below which an approach should not be continued if natural visual reference is not acquired, requiring either:

(a) reversion to head-down displays to control missed approach; or

(b) reversion to flight with no, or downgraded, guidance to control missed approaches from the DH or below, including those which may result in a touchdown on the runway;

(C) incapacitation procedures appropriate to EFVS operations; and

(D) failures and procedures applicable to the specific EFVS installation and aircraft type.

(v) FSTD training should include a minimum of eight approaches.

(vi) If a flight crew member is to be authorised to operate as pilot flying and pilot monitoring during EFVS operations, then the flight crew member should complete the required FSTD training for each operating capacity.

(3) A check requiring the completion of at least the following exercises in an aircraft or FSTD:

(i) Low-visibility approaches in simulated instrument flight conditions down to the applicable DH, using the flight guidance system. Standard procedures of crew coordination (task sharing, call-out procedures, mutual surveillance, information exchange and support) should be observed. For EFVS-L operations, the operator should use an FSTD approved for this purpose.

(ii) Go-around after approaches as indicated in (2) at any point between 500 ft above ground level (AGL)and on reaching the DH, and

(iii) Landing(s) after natural visual reference is established for EFVS-A or sufficient enhanced visibility is established for EFVS-L.

(4) For operators for which LIFUS is required by Part-ORO, practice in approaches during LIFUS, as follows:

(i) if EFVS is used to touchdown, four landings; or

(ii) otherwise, three landings.

(b) For flight crew members who have previous experience of EFVS operations requiring an approval under this Subpart with a UK operator, when changing to an aircraft for which a new class or type rating is required, with the same operator:

(1) A course of ground training as specified in (a)(1), taking into account the flight crew member's existing knowledge of low-visibility approach operations.

(2) The course of FSTD and/or flight training required by (a)(2) above. If the flight crew member's previous experience of low-visibility approach operations is on a type where the following were the same or similar:

(i) the technology used in the EFVS sensor, flight guidance and flight control system;

(ii) operating procedures; and

(iii) handling characteristics,

then the flight crew member may complete an abbreviated course of FSTD and/or flight training. Such an abbreviated course should meet the objectives described in (a)(2), it does not need to include the number of approaches required by (a)(2)(v), but should include at least the following number of landings:

(i) for EFVS to touchdown, four approaches including a landing at the lowest approved RVR and a go-around, or

(ii) otherwise, two approaches including a landing at the lowest approved RVR and a go-around.

(c) For flight crew members who have previous experience of EFVS operations requiring an approval under this Subpart with a UK operator, when joining another operator:

(1) A course of ground training as specified in (a)(1), taking into account the flight crew member's existing knowledge of low-visibility approach operations.

(2) The course of FSTD and/or flight training required by (a)(2) above. If the flight crew member's previous experience of EFVS operations is on the same aircraft type and variant with the same EFVS or on a different type or different EFVS where the following were the same or similar:

(i) the technology used in the EFVS sensor, flight guidance and flight control system;

(ii) operating procedures; and

(iii) handling characteristics,

then the flight crew member may complete an abbreviated course of FSTD and/or flight training.

(3) Such an abbreviated course should meet the objectives described in (a)(2), it does not need to include the number of approaches required by (a)(2)(v), but should include at least the following number of landings:

(i) for EFVS to touchdown, four approaches including a landing at the lowest approved RVR and a go-around, or

(ii) otherwise, two approaches including a landing at the lowest approved RVR and a go-around.

(4) Practice in approaches during LIFUS as required by (a)(3) above unless the flight crew member's previous experience of low-visibility approach operations is on the same aircraft type and variant.

The following AMC4 SPA.LVO.120(b) is inserted:

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

RECURRENT CHECKING FOR LVTO, SA CAT I, CAT II, SA CAT II AND CAT III APPROACH OPERATIONS

(a) The operator should ensure that the pilots' competence to perform LVOs for which they are authorised is checked by completing at least the following exercises:

(1) One or more low-visibility rejected take-off at minimum approved RVR at least once over the period between two operator proficiency checks or once at every periodic demonstration of competence or, for an ATQP operator, at each required operator proficiency check or alternatively at each required LOE (i.e. approximately one or more RTO per year).

(2) Pilots authorised for LVTO operations in an RVR of less than 150 m should conduct at least one LVTO in the minimum approved visibility at each required operator proficiency check

or periodic demonstration of competence (i.e. approximately one or more RTO every semester).

(3) One or more low-visibility approaches in simulated instrument flight conditions down to a point between 500ft AGL and the threshold (e.g applicable DH), followed by go-around, at each required operator proficiency check or periodic demonstration of competence; and

(4) One or more low-visibility approach and landings with visual reference established at the DH at each required operator proficiency check or periodic demonstration of competence.

(b) Pilots authorised to conduct CAT III operations on aircraft with a fail-passive autoland system, or HUDLS or equivalent, should complete a missed approach at least once over the period of three consecutive operator proficiency checks or demonstrations of competence as the result of an equipment failure at or below the DH when the last reported RVR was less than 300m.

For ATQP operators, pilots authorised to conduct CAT III operations on aircraft with a fail-passive Autoland system, or HUDLS or equivalent, should complete a missed approach at least once every two OPCs or LOE (a period of about 2 years).

(c) CAT III approach operations should be conducted in an FSTD. Other exercises may be conducted in an FSTD or aircraft.

The following AMC5 SPA.LVO.120(b) is inserted:

AMC5 SPA.LVO.120(b) Flight crew competence

DIFFERENCES TRAINING FOR LVTO, SA CAT I, CAT II, SA CAT II AND CAT III APPROACH OPERATIONS

(a) The operator should ensure that the flight crew members are provided with differences training or familiarisation whenever they are required to conduct low-visibility approach operations or operations with operational credits requiring an approval under this Subpart for which they are not already authorised, or whenever there is a change to any of the following:

(1) the technology used in the flight guidance and flight control system;

(2) the operating procedures including:

(i) fail-passive/fail-operational;

(ii) alert height;

(iii) manual landing or automatic landing;

(iv) operations with DH or no DH operations;

(3) the handling characteristics;

(4) the use of HUD/HUDLS or equivalent display systems;

(5) the use of EFVS.

(b) The differences training should:

(1) meet the objectives of the appropriate initial training course;

(2) take into account the flight crew members' previous experience; and

(3) take into account the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

The following AMC6 SPA.LVO.120(b) is inserted:

AMC6 SPA.LVO.120(b) Flight crew competence

RECURRENT CHECKING FOR EFVS OPERATIONS

(a) The operator should ensure that the pilots' competence to perform EFVS operations is checked at each required demonstration of competence or operator proficiency check by performing at least two approaches of which one should be flown without natural vision, to the height below which an approach should not be continued if natural visual reference (EFVS-A) or enhanced visibility (EFVS-L), is not acquired.

(b) If a flight crew member is authorised to operate as pilot flying and pilot monitoring during EFVS operations, then the flight crew member should complete the required number of approaches in each operating capacity.

The following AMC7 SPA.LVO.120(b) is inserted:

AMC7 SPA.LVO.120(b) Flight crew competence

DIFFERENCES TRAINING FOR EFVS OPERATIONS

(a) The operator should ensure that the flight crew members authorised to conduct EFVS operations are provided with differences training or familiarisation whenever there is a change to any of the following:

(1) the technology used in the EFVS sensor, flight guidance and flight control system;

(2) the operating procedures;

(3) the handling characteristics.

(b) The differences training should:

(1) meet the objectives of the appropriate initial training course;

(2) take into account the flight crew members' previous experience; and

(3) take into account the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

The following GM1 SPA.LVO.120(b) is inserted:

GM1 SPA.LVO.120(b) Flight crew competence

FLIGHT CREW TRAINING

(a) The number of approaches referred to in AMC2, AMC3, AMC4 and AMC6 to SPA.LVO.120(b) represents the minimum number of approaches that the flight crew members should conduct during initial and recurrent training and checking. More approaches or other training exercises may be required in order to ensure that flight crew members achieve the required proficiency.

(b) Where flight crew members are to be authorised to conduct more than one kind of LVOs including operations with operational credits for which the technology and operating procedures are similar, there is no requirement to increase the number of approaches in initial training if the training programme ensures that the flight crew members are competent for all operations for which they will be authorised. Where flight crew members are to be authorised to conduct more than one kind of LVOs including operations with operational credits using different technology or operating procedures, then the required minimum number of approaches should be completed for each different technology or operating procedure.

(c) Where flight crew members are authorised to conduct more than one kind of LVOs including operations with operational credits for which the technology and operating procedures are similar, then there is no requirement to increase the number of approaches flown during recurrent checking. However, where flight crew members are authorised to conduct more than one kind of LVOs including operations with operational credits using different technology or operating procedures, then the required number of approaches should be completed for each different technology or operating procedure.

(d) Flight crew members are required to complete initial FSTD training and maintain recency for each operating capacity for which they will be authorised (e.g. as pilot flying and/or pilot monitoring). A pilot who will be authorised to operate in either capacity will need to complete the minimum number of approaches in each capacity.

(e) Approaches conducted in a suitably qualified FSTD and/or during a proficiency check or demonstration of competence may be counted towards the recent experience requirements. If a flight crew member has not complied with the recent experience requirements of AMC2 SPA.LVO.120(a) or AMC3 SPA.LVO.120(a), the required approaches may be conducted during recurrent training, an operator proficiency check or a periodic check of competence either in an aircraft or on an FSTD.

(f) Table 1 presents a summary of initial training requirements for LVOs and operations with operational credits.

(g) Table 2 presents a summary of recent experience and recurrent training/checking requirements for LVOs and operations with operational credits.

Table 1

Summary of initial training requirements for LVOs and operations with operational credits

Approval	Airborne equipment	Previous experience	Reference	Practical (FSTD) training[4]	LIFUS (if required)[4]
CAT II	Auto coupled to below DH with manual landing	none	AMC2 SPA.LVO.120(b) point (a)(2)(v)	As required but not less than 6 approaches	3 landings or 1 landing[1]
		Previously qualified with the same operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (b)(2)(ii)	2 approaches	none

Approval	Airborne equipment	Previous experience	Reference	Practical (FSTD) training[4]	LIFUS (if required)[4]
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	none
		Previously qualified with a different EU operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	3 landings or 1 landing[1]
SA CAT I CAT II SA CAT II CAT III	Autoland	none	AMC2 SPA.LVO.120(b) point (a)(4)(ii)	As required but not less than 6 approaches	2 landings or 1 landing[1] or no landings[2]
		Previously qualified with the same operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (b)(3)(ii)	2 approaches	None
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	none
		Previously qualified with a different EU operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	2 landings or 1 landing[1] or no landings[2]
CAT II SA CAT II CAT III	HUDLS / manual landing	none	AMC2 SPA.LVO.120(b) point (a)(2)(v)	As required but not less than 8 approaches	4 landings or 2 landings[1]
		Previously qualified with the same operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (b)(3)(i)	4 approaches	None
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	none
		Previously qualified with a different EU operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	4 landings or 2 landings[1]
SA CAT I CAT II SA CAT II CAT III	HUDLS / automatic landing	none	AMC2 SPA.LVO.120(b) point (a)(4)	As required but not less than 8 approaches	2 landings or 1 landing[1] or no landings[2]
		Previously qualified with the same operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (b)(3)	4 approaches	None
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	None
		Previously qualified with a different EU operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	2 landings or 1 landing[1] or no landings[2]

Approval	Airborne equipment	Previous experience	Reference	Practical (FSTD) training[4]	LIFUS (if required)[4]
EFVS-A	EFVS with HUD / HUDLS	none	AMC3 SPA.LVO.120(b) point (a)(2)	As required but not less than 8 approaches	3 landings
		Previously qualified with the same operator, similar operations[3]	AMC3 SPA.LVO.120(b) point (b)(3)	2 approaches	none
		Previously qualified with a different EU operator, same type and variant	AMC3 SPA.LVO.120(b) point (c)(2)	2 approaches	none
		Previously qualified with a different EU operator, similar operations[3]	AMC3 SPA.LVO.120(b) point (c)(2)	2 approaches	3 landings
EFVS-L	EFVS with HUD / HUDLS	none	AMC3 SPA.LVO.120(b) point (a)(2)	As required but not less than 8 approaches	4 landings
		Previously qualified with the same operator, similar operations[3]	AMC3 SPA.LVO.120(b) point (b)(3)	4 approaches	none
		Previously qualified with a different EU operator, same type and variant	AMC3 SPA.LVO.120(b) point (c)(2)	4 approaches	none
		Previously qualified with a different EU operator, similar operations[3]	AMC3 SPA.LVO.120(b) point (c)(2)	4 approaches	4 landings

Notes:

1: Fewer landings during LIFUS are required if a level 'D' FSTD is used for conversion training.

2: No landings are required if a candidate has completed the zero flight-time (ZFT) type rating.

3: 'Similar operations' implies that the level of technology, operating procedures, handling characteristics and HUD/HUDLS or equivalent display systems are the same or similar.

4: 'operational suitability data established in accordance with UK Regulation (EU) No 748/2012 may define credits'

Table 2

Summary of recent experience and recurrent training/checking requirements for LVOs and operations with operational credits

LVO / operational credit	Airborne equipment	Recent experience[1, 2]	Reference	Recurrent training / checking	Reference
LVTO	-	-	-	1 rejected take-off and 1 LVTO at minimum RVR[1]	AMC4 SPA.LVO.120(b) point (a)(1), (a)(2)
CAT II	Auto coupled below DH			1 approach to land;	

LVO / operational credit	Airborne equipment	Recent experience[1, 2]	Reference	Recurrent training / checking	Reference
	with manual landing	2 or more approaches[4]	AMC3 SPA.LVO.120(a) points (a) and (b)	1 approach to go-around	AMC4 SPA.LVO.120(b) point (a)(2), (a)(3)
SA CAT I CAT II SA CAT II CAT III	Autoland				
CAT II / III SA CAT I SA CAT II	HUDLS / manual landing	2 or 4 approaches	AMC3 SPA.LVO.120(a) point (c)	2 approaches including a landing	AMC4 SPA.LVO.120(b) point (b)
CAT II / III SA CAT I SA CAT II	HUDLS / automatic landing				
Approach using EFVS	(HUD / HUDLS)	2 approaches[4]	AMC2 SPA.LVO.120(a)	2 approaches[3]	AMC6 SPA.LVO.120(b)

Notes:

1: LVTO only required if the minimum approved RVR is less than 150m.

2: If a flight crew member is authorised to operate as pilot flying and pilot monitoring, then the flight crew member should complete the required number of approaches in each operating capacity.

3: One approach to be flown without natural vision, to the height below which an approach should not be continued if natural visual reference is not acquired.

4: 'operational suitability data established in accordance with UK Regulation (EU) No 748/2012 may define credits'

The following GM2 SPA.LVO.120(b) is inserted:

GM2 SPA.LVO.120(b) Flight crew competence

RECURRENT TRAINING AND CHECKING FOR EFVS OPERATIONS

In order to provide the opportunity to practice decision-making in the event of system failures and failure to acquire natural visual reference, the recurrent training and checking for EFVS operations is recommended to periodically include different combinations of equipment failures, go-around due to loss of visual reference and landings.

The following GM3 SPA.LVO.120(b) is inserted:

GM3 SPA.LVO.120(b) Flight crew competence

INITIAL TRAINING AND CHECKING FOR SA CAT I, CAT II, SA CAT II AND CAT III APPROACH OPERATIONS

The ground training referred to in points (a)(1)(i) and (iv) of AMC2 SPA.LVO.120(b) may include:

(a) airborne and ground equipment:

(1) technical requirements;

(2) operational requirements;

(3) operational reliability;

(4) fail-operational;

(5) fail-passive;

(6) equipment reliability;

(7) operating procedures;

(8) preparatory measures;

(9) operational downgrading; and

(10) communications; and

(b) procedures and limitations:

(1) operating procedures; and

(2) crew coordination.

GM4 SPA.LVO.120(b) Flight crew competence

USE OF AIRCRAFT FOR TRAINING AND CHECKING

Where training and checking is conducted on an aircraft, SA CAT I, CAT II SA CAT II and EFVS approach operations should not be completed in lower than CAT I conditions unless the crew are fully qualified for that approach operation.

AMC1 SPA.LVO.125 is deleted:

~~AMC1 SPA.LVO.125 Operating procedures~~

~~**GENERAL**~~

~~(a) LVOs should include the following:~~

~~(1) manual take-off, with or without electronic guidance systems or HUDLS/hybrid HUD/HUDLS;~~

~~(2) approach flown with the use of a HUDLS/hybrid HUD/HUDLS and/or EVS;~~

~~(3) auto-coupled approach to below DH, with manual flare, hover, landing and rollout;~~

~~(4) auto-coupled approach followed by auto-flare, hover, auto-landing and manual rollout; and~~

~~(5) auto-coupled approach followed by auto-flare, hover, auto-landing and auto-rollout, when the applicable RVR is less than 400 m.~~

~~PROCEDURES AND INSTRUCTIONS~~

~~(b) The operator should specify detailed operating procedures and instructions in the operations manual or procedures manual.~~

~~(1) The precise nature and scope of procedures and instructions given should depend upon the airborne equipment used and the flight deck procedures followed. The operator should clearly define flight crew member duties during take-off, approach, flare, hover, rollout and missed approach in the operations manual or procedures manual. Particular emphasis should 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/her to devote himself/herself to supervision and the decision making process.~~

~~(2) The instructions should be compatible with the limitations and mandatory procedures contained in the AFM and cover the following items in particular:~~

~~(i) checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;~~

~~(ii) effect on minima caused by changes in the status of the ground installations and airborne equipment;~~

~~(iii) procedures for the take-off, approach, flare, hover, landing, rollout and missed approach;~~

~~(iv) procedures to be followed in the event of failures, warnings to include HUD/HUDLS/EVS and other non-normal situations;~~

~~(v) the minimum visual reference required;~~

~~(vi) the importance of correct seating and eye position;~~

~~(vii) action that may be necessary arising from a deterioration of the visual reference;~~

~~(viii) allocation of crew duties in the carrying out of the procedures according to (b)(2)(i) to (iv) and (vi), to allow the pilot-in-command/commander to devote himself/herself mainly to supervision and decision making;~~

~~(ix) the rule 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;~~

~~(x) the rule for the localiser sensitive area to be protected;~~

~~(xi) the use of information relating to wind velocity, wind shear, turbulence, runway contamination and use of multiple RVR assessments;~~

~~(xii) procedures to be used for:~~

~~(A) LTS CAT I;~~

~~(B) OTS CAT II;~~

~~(C) approach operations utilising EVS; and~~

~~(D) practice approaches and landing on runways at which the full CAT II or CAT III aerodrome procedures are not in force;~~

~~(xiii) operating limitations resulting from airworthiness certification; and~~

~~(xiv) information on the maximum deviation allowed from the ILS glide path and/or localiser.~~

The following AMC1 SPA.NVIS.120 is inserted:

AMC1 SPA.NVIS.120 NVIS operating minima

NVIS OPERATIONS UNDER IFR

(a) Any limitation in the rotorcraft flight manual should be complied with.

(b) Night-vision goggles may be used in a flipped-down position during a flight under IFR:

(1) under VMC;

(2) under IMC:

(i) in preparation of the visual segment of an instrument approach or a visual approach;

(ii) during the visual segment of an instrument approach or departure;

(iii) during a visual approach;

(iv) in preparation of a transition to VFR.

(c) The pilot-in-command/commander should not proceed on a visual segment of an IFR flight unless the visual cues required for the visual segment are visible using unaided vision.

(d) The pilot-in-command/commander should not proceed VFR unless the VFR weather minima are assessed without using unaided vision.

The following GM1 SPA.NVIS.120 is inserted:

GM1 SPA.NVIS.120 NVIS operating minima

NVIS OPERATIONS UNDER IFR

The use of night-vision goggles in a flipped-down position does not prevent the use of unaided vision, by looking out below the goggles or to the sides.

AMC1 SPA.NVIS.130(f) is replaced by the following:

AMC1 SPA.NVIS.130(f) Crew requirements for NVIS operations

CHECKING OF NVIS CREW MEMBERS

(a) The operator proficiency check and line check required in SPA.NVIS.130(f) should have a validity of 12 calendar months. The validity period should be counted from the end of the month when the training was taken. When the check is undertaken within the last 3 months of the validity period, the new validity period should be counted from the previous expiry date.

(b) These ~~The~~ checks ~~required in SPA.NVIS.130 (f)~~ may be combined with those checks required for the underlying activity.

The following AMC2 SPA.NVIS.130(f) is inserted:

AMC2 SPA.NVIS.130(f) Crew requirements for NVIS operations

CREW TRAINING AND CHECKING — NVIS OPERATIONS UNDER IFR

(a) The minimum crew should be two pilots, or one pilot and one NVIS technical crew member.

(b) The crew training and experience should ensure:

(1) efficient scanning of the instruments with the night-vision goggles (NVGs) flipped up or down as defined in the standard operating procedures (SOPs);

(2) proficiency during the transition phase;

(3) proficient use of the NVGs on the visual segments of the flight during which they are expected to be used;

(4) the continuity of a crew concept.

(c) A crew member that is involved in NVIS operations under IFR should undergo initial and recurrent training using a suitable FSTD as part of the normal crew complement. The training should cover at least the following items under a variety of weather conditions and cultural lighting:

(1) transition from instrument to visual flight during the final approach;

(2) transition from visual to instrument flight on departure.

(d) In addition to (b) and (c), a technical crew member that is involved in NVIS operations under IFR should be trained to perform navigation and monitoring functions under IFR, as described under AMC3 SPA.NVIS.130(f). The training should include all of the following on the given helicopter type:

(1) initial and recurrent general training;

(2) initial and recurrent monitoring training;

(3) initial and recurrent navigation training;

(4) initial and recurrent aircraft/FSTD training focusing on crew cooperation with the pilot;

(5) LIFUS.

(e) An FSTD suitable for the NVIS training described in (c) should meet all of the following criteria:

(1) be a helicopter FSTD;

(2 have a NVIS-compatible cockpit;

(3) have a night visual system that can be representative of different moon phases and allows external visual cues to be adjusted to the point where they are no longer visible without NVGs and remain visible with NVGs, when simulating night conditions;

(4) The night visual system should be able to support atmospheric conditions such as:

(i) more than one cloud layer or one cloud layer with a geographically variable cloud base;

(ii) variable visibility; and

(iii) snow, light rain and heavy rain with and without NVGs;

(5) be of a helicopter type on which the crew member is current unless the crew member receives additional training for the use of the FSTD.

(f) The person conducting the training defined in (c) above should be a NVIS instructor and should hold an instrument rating in accordance with UK Regulation (EU) No 1178/2011.

(g) The training should have a validity of 12 calendar months. The validity period should be counted from the end of the month when the training was taken. When the training is undertaken within the last 3 months of the validity period, the new validity period should be counted from the previous expiry date.

(h) The flight crew operator proficiency check should include one transition from instrument to visual flight during the final approach, using NVIS. This manoeuvre may be combined with a 2D or 3D approach to minima.

(i) NVIS operations under IFR on more than one type or variant with different levels of automation

(1) The crew member should be provided with differences training or familiarisation.

(2) The flight crew member should perform the manoeuvre defined in (h) each time on a different type or variant.

The following AMC3 SPA.NVIS.130(f) is inserted:

AMC3 SPA.NVIS.130(f) Crew requirements for NVIS operations

CREW TRAINING AND CHECKING — TECHNICAL CREW MEMBER TRAINING FOR OPERATIONS UNDER IFR — INITIAL AND RECURRENT GENERAL TRAINING AND CHECKING

(a) The technical crew member initial and recurrent training and checking syllabus should include the following items:

(1) duties in the technical crew member role;

(2) map reading, including:

(i) ability to keep track with helicopter position on map;

(ii) ability to detect conflicting terrain/obstacles on a given route, and at a given altitude;

(iii) use of moving maps, as required;

(3) basic understanding of the helicopter type in terms of location and design of normal and emergency systems and equipment, including all helicopter lights and operation of doors, and including knowledge of helicopter systems and understanding of the terminology used in checklists;

(4) the dangers of rotor-running helicopters;

(5) outside lookout during the flight;

(6) crew coordination with in-flight call-outs, with emphasis on crew coordination regarding the tasks of the technical crew member, including checklist initiation, interruptions and termination;

(7) warnings, and use of normal, abnormal and emergency checklists assisting the pilot as required;

(8) the use of the helicopter intercommunications system;

(9) basic helicopter performance principles, including the definitions of Category A certification, performance class 1 and performance class 2;

(10) operational control and supervision;

(11) meteorology;

(12) applicable parts of SERA, including instrument flight rules (IFR), as relevant to the tasks of the technical crew member;

(13) mission planning;

(14) early identification of pilot incapacitation;

(15) debriefing; and

(16) PBN, as necessary.

INITIAL AND RECURRENT NAVIGATION TRAINING AND CHECKING

(b) The initial and recurrent navigation training and checking syllabus should include the following items:

(1) aeronautical map reading (additional training to (a)(4) above), navigation principles;

(2) navigation aid principles and use;

(3) crew coordination with in-flight call-outs, with emphasis on navigation issues;

(4) applicable parts of SERA; and

(5) airspace, restricted areas, and noise-abatement procedures.

INITIAL AND RECURRENT MONITORING TRAINING AND CHECKING

(c) The initial and recurrent monitoring training and checking syllabus should include the following items:

(1) basic understanding of the helicopter type, including knowledge of any limitations to the parameters the crew member is tasked to monitor, and knowledge of the basic principles of flight;

(2) instrument reading;

(3) inside monitoring during the flight;

(i) aircraft state/cockpit cross-check;

(ii) automation philosophy and autopilot status monitoring, as relevant;

(iii) FMS, as relevant;

(4) crew coordination with in-flight call-outs, with emphasis on call-outs and actions resulting from the monitoring process; and

(5) flight path monitoring.

INITIAL AIRCRAFT/FSTD TRAINING

(d) The technical crew member training syllabus should include aircraft/FSTD training focusing on crew cooperation with the pilot.

(1) The initial training should include at least 4 hours instruction dedicated to crew cooperation unless:

(i) the technical crew member has undergone this training under another operator; or

(ii) the technical crew member has performed at least 50 missions in assisting the pilot from the front seat as a technical crew member.

(2) The training described in (1) should be organised with a crew composition of one pilot and one technical crew member.

(3) The training described in (1) should be supervised by a pilot with a minimum experience of 500 hours in either multi-pilot operations or single-pilot operations with a technical crew member assisting from the front seat, or a combination of these.

(4) The training may be combined with the LIFUS.

LINE FLYING UNDER SUPERVISION (LIFUS)

(e) LIFUS

(1) LIFUS should take place during the operator's conversion course.

(2) Line flights under supervision provide the opportunity for a technical crew member to practice the procedures and techniques he or she should be familiar with, regarding ground and flight operations, including any elements that are specific to a particular helicopter type. Upon completion of the LIFUS, the technical crew member should be able to safely conduct the flight operational duties assigned to him or her according to the procedures laid down in the operator's operations manual.

(3) LIFUS should be conducted by a suitably qualified technical crew member or commander nominated by the operator.

(4) LIFUS should include a minimum of five sectors under IFR.

RECURRENT AIRCRAFT/FSTD TRAINING

(f) Recurrent helicopter/FSTD training

(1) The recurrent training should focus on crew cooperation and contain a minimum of 2 hours of flight.

(2) The training described in (1) should take place in the same conditions as the initial training in (d) above.

The title of GM1 SPA.NVIS.130(f) is replaced by the following:

GM1 SPA.NVIS.130(f) Crew requirements for NVIS operations

(…)

The title of GM2 SPA.NVIS.130(f) is replaced by the following:

GM2 SPA.NVIS.130(f) Crew requirements for NVIS operations

(…)

The title of GM3 SPA.NVIS.130(f) is replaced by the following:

GM3 SPA.NVIS.130(f) Crew requirements for NVIS operations

(…)

The title of GM4 SPA.NVIS.130(f) is replaced by the following:

GM4 SPA.NVIS.130(f) Crew requirements for NVIS operations

(…)

The following GM5 SPA.NVIS.130(f) is inserted:

GM5 SPA.NVIS.130(f) Crew requirements for NVIS operations

CREW TRAINING AND CHECKING — SUITABLE FSTD — NVIS OPERATIONS UNDER IFR

The FSTD may be a generic FSTD and may have no motion system.

GM1 SPA.NVIS.140 is replaced by the following:

GM1 SPA.NVIS.140 Information and documentation

[…]

Executive summary

[…]

Simply stated, night vision imaging systems are an aid to night VFR flight. Currently, such systems consist of a set of night vision goggles and normally a complilementary array of cockpit lighting modifications. The specifications of these two sub-system elements are interdependent and, as technology advances, the characteristics associated with each element are expected to evolve. The complete description and performance standards of the night vision goggles and cockpit lighting modifications appropriate to civil aviation are contained in the Minimum Operational Performance Standards for Integrated Night Vision Imaging System Equipment.

[…]

An FAA study (DOT/FAA/RD-94/21, 1994) best summarised the need for night vision imaging systems by stating, "'When properly used, NVGs can increase safety, enhance situational awareness, and reduce pilot workload and stress that are typically associated with night operations."'

Concept of operations — NVIS operations under IFR

The NVIS can be useful to assess the environment when not in a cloud layer if procedures are established for its use. It may also be useful for decision-making before cancelling IFR and during the transition from instrument flight to visual flight under IFR.

During departure, the NVIS provides extra safety if used correctly. This is especially true for a departure where the instruction is to proceed VFR from the FATO to the initial departure fix (IDF) because VFR departures provide no obstacle protection. It could also be useful for other instrument departures.

During the transition to visual flight, the NVIS provides additional safety because the visibility may be very different with or without the NVIS, and it may help to assess the situation.

The scanning of instruments and of external cues will be modified. Multi-crew operations with SOPs and the relevant training should be in place.

Operator SOPs may define that when one of the crew members uses the NVGs in a flipped-down position, the other should have the NVGs flipped up and should monitor the flight instruments and navigation instruments used for the flight. In this case, the continuity of the crew concept will rely on efficient crew communication.

In other situations and operations, the operator SOPs may also define that both crew members have NVGs in the flipped-down position, using the capability to look below the NVGs to monitor both the instruments and the VMC situation.

2. Terminology

[…]

3. SYSTEM DESCRIPTION

[…]

3.2.1.7 LED lights

Some red obstacle lights and other artificial lights that are clearly visible to the naked eye are not visible to NVGs. These obstacle lights may employ LED instead of traditional incandescent sources. The use of LED lights is becoming more common for almost all lighting applications because of their extensive lifetime and low energy consumption.

Aviation red light ranges from about 610 to 700 nanometres (nm), and NVGs approved for civil aviation (having a Class B Minus Blue Filter) are only sensitive to energy ranging from 665 to about 930 nm. LED and other artificial lights may have a relatively narrow emission band (around 630 nm ± 20 nm) and that band is below the range in which NVGs are sensitive and LEDs do not emit infrared energy like incandescent lights for obstacle red lights.

In general terms, NVG users should be aware that obstacle lighting systems and other artificial lights that fall outside the combined visible and near-infrared spectrum of NVGs (approximately 665 to 930 nm) will not be visible to their goggles. Other obstacle lights may use a wavelength very close to the approximate cut-off wavelength of 665 nm and will remain visible to the goggles, but they will be dimmed and will be better seen with the naked eye.

Full awareness of obstacle lights can only be achieved with an unaided scan.

[…]

3.2.2.6 Instrument lighting brightness considerations

When viewing the NVG image, the brightness of the image will affect the amount of time it takes to adapt to the brightness level of the instrument lighting, thereby affecting the time it takes to interpret information provided by the instruments. The higher the quality (figure of merit (FOM), resolution, filters, contrast, etc.) of the 'tubes', the less critical this effect becomes.

For example, if the instrument lighting is fairly bright, the time it takes to interpret information provided by the instruments may be instantaneous. However, if the brightness of the lighting is set to a very low level, it may take several seconds to interpret the information, thus increasing the heads-down time and increasing the risk of spatial disorientation. It is important to ensure that instrument lighting is kept at a brightness level that makes it easy to rapidly interpret the information. This will likely be brighter than the one that is used ~~to~~ during unaided operations. If the NVGs are used in the transition phase from IFR to VFR, the brightness level of the instrument lighting should be set in advance.

[…]

4. OPERATIONS

[…]

4.2.2.2 Artificial illumination

Since ~~the~~ NVGs are sensitive to any source of energy in the visible and near-infrared spectrums, there are also many types of artificial illumination sources (e.g.~~,~~ flares, IR searchlights, cultural lighting, etc.). As with any illumination source, these can have both positive and detrimental effects on NVG utili~~z~~sation. For example, viewing a scene indirectly illuminated by a searchlight can enable the pilot to more clearly view the scene; conversely, viewing the same scene with the searchlight near or within the NVG field of view will reduce the available visual cues. It is important to be familiar with the effects of cultural lighting in the flying area in order to be able to avoid the associated problems and to be able to use the advantages provided. Also, it is important to know how to properly use artificial light sources (e.g.~~,~~ aircraft IR spotlight). It should be noted that artificial light sources may not always be available or dependable, and this should be taken into consideration during flight planning.

When using NVGs in an area with high-intensity cultural lighting, the lights beyond this area may not be visible. The visibility assessed with the NVGs might be judged to be worse than the unaided visibility.

[…]

4.4.1.1.3 Unaided scan

Under certain conditions, this scan can be as important as the others can. For example, it may be possible to detect distance and/or closure to another aircraft more easily using unaided vision, especially if the halo caused by the external lights ~~is masking~~ masks aircraft details on the NVG image. Additionally, there are other times when unaided information can be used in lieu of or can augment NVG and instrument information.

When using the NVGs in the transition from IFR to VFR, the unaided scan is essential to assess the unaided visibility conditions. Focusing on the first light seen when looking out is an automatic response, but it is vital to continue the scan in order to assess the surrounding weather conditions.

Some examples where unaided scan can enhance safety is where LED-lit obstacles can be encountered (e.g. during low-altitude flying and when performing a reconnaissance of landing areas) or when unmanned aircraft systems (UASs) fly at night with LED navigation lights.

Air operators should incorporate procedures into their manuals and/or SOPs that require periodic unaided scanning when operating at low altitudes, when looking for potential landing areas, and when performing a reconnaissance of a landing area. This may be accomplished by looking under the NVGs, or by briefly placing the NVGs in the stowed (flipped-up) position. Manuals/SOPs should include procedures and call-outs for LED-lit obstacles.

Air operators and pilots are encouraged to report encounters with obstacles equipped with LED lighting systems not visible by NVGs, with pertinent information, to the CAA.

[…]

The following AMC1 SPA.HOFO.110(a)(4) is inserted:

AMC1 SPA.HOFO.110(a)(4) Operating procedures

REFUELLING PROCEDURE

If refuelling with the rotors turning is conducted, a procedure should be established and used in Accordance with point **CAT.OP.MPA.200**.

AMC1 SPA.HOFO.120 is replaced by the following:

AMC1 SPA.HOFO.120 Selection of aerodromes and operating sites

~~COASTAL AERODROME~~ DESTINATION AERODROME — SUFFICIENT OPERATIONAL CONTINGENCY

(a) Any alleviation from the requirement to select an alternate aerodrome ~~for a flight to a costal aerodrome~~ under instrument flight rules (IFR) routing from offshore to a land destination should be based on an individual safety risk assessment with sufficient operational contingency to ensure a safe return from offshore.

REVISED AERODROME OPERATING MINIMA

(b) Unless the destination is a coastal aerodrome, the operator should ensure that all the following criteria are met:

(1) the destination aerodrome has a published instrument approach;

(2) the flight time is less than 3 hours; and

(3) the published weather forecast valid from 1 hour prior, and 1 hour subsequent to the expected landing time specifies that:

(i) the ceiling is at least 700ft above the minima associated with the instrument approach, or 1 000ft above the destination aerodrome, whichever is the higher; and

(ii) visibility is at least 2 500 m.

COASTAL AERODROME

(c) A coastal aerodrome is an aerodrome used for offshore operations within 5 nm of the coastline.

(d) If the coastal aerodrome has a published instrument approach, the operator should use the aerodrome operating minima defined in (b)(3).

(e) The operator may use the following operating minima by day only, as an alternative to (b)(3):

(1) the cloud base is at least 400ft above the minima associated with the instrument approach; and

(2) visibility is at least 4 km.

(f) If descent over the sea is intended to meet VFR criteria, the operator should ensure that the coastal aerodrome is geographically sited so that the helicopter is able, within the rules of the air and within the landing forecast, to proceed inbound from the coast and carry out an approach and landing in full compliance with VFR for the associated airspace category(ies) and any notified route.

(g) If the operator makes use of the provisions in (e) or (f), the following should be taken into account as part of the risk assessment:

1) where the destination coastal aerodrome is not directly on the coast, the required usable fuel for the flight should be sufficient to return to the coast at any time after crossing the coastline, descend safely, carry out an approach under VFR and land, with the VFR fuel reserves intact;

(2) the descent to establish visual contact with the surface should take place over the sea away from the coastline and in an area clear of surface obstructions, or as part of the instrument approach;

(3) routings and procedures for coastal aerodromes nominated as such should be included in the operations manual (Part C for CAT operators);

(4) the MEL should reflect the requirement for airborne radar and radio altimeter for this type of operation; and

(5) operational limitations for each coastal aerodrome should be specified in the operations manual.

~~(b) The following should be taken into account:~~

~~(1) suitability of the weather based on the landing forecast for the destination;~~

~~(2) the fuel required to meet the IFR requirements of CAT.OP.MPA.150, NCC.OP.131 or SPO.OP.131 except for the alternate fuel;~~

~~(3) where the destination coastal aerodrome is not directly on the coast, it should be:~~

~~(i) within a distance that with the fuel specified in (b)(2), the helicopter is able, at any time after crossing the coastline, to return to the coast, descend safely, carry out an approach under visual flight rules (VFR) and land, with the VFR fuel reserves intact;~~

~~(ii) within 5 nm of the coastline; and~~

~~(iii) geographically sited so that the helicopter is able, within the rules of the air and within the landing forecast:~~

~~(A) to proceed inbound from the coast at 500 ft above ground level (AGL), and carry out an approach and landing under VFR; or~~

~~(B) to proceed inbound from the coast on an agreed route, and carry out an approach and landing under VFR;~~

~~(4) procedures for coastal aerodromes should be based on a landing forecast no worse than:~~

~~(i) by day, a cloud base of ≥ 400 ft above descent height (DH)/minimum descent height (MDH), and a visibility of 4 km, or, if descent over the sea is intended, a cloud base of 600 ft and a visibility of 4 km; or~~

~~(ii) by night, a cloud base of 1 000 ft and a visibility of 5 km;~~

~~(5) the descent to establish visual contact with the surface should take place over the sea or as part of the instrument approach;~~

~~(6) routings and procedures for coastal aerodromes nominated as such should be included in the operations manual (OM) (Part C for CAT operators);~~

~~(7) the minimum equipment list (MEL) should reflect the requirement for airborne radar and radio altimeter for this type of operation; and~~

~~(8) operational limitations for each coastal aerodrome should be specified in the OM.~~

AMC1 SPA.HOFO.125 is replaced by the following:

AMC1 SPA.HOFO.125 ~~Airborne radar approach (ARA) to offshore locations~~ Offshore standard approach procedures (OSAPs)

AIRBORNE RADAR APPROACH (ARA) ~~GENERAL~~

(…)

The following AMC2 SPA.HOFO.125 is inserted:

AMC2 SPA.HOFO.125 Offshore standard approach procedures (OSAPs)

OSAP — ORIGINAL EQUIPMENT MANUFACTURER (OEM) — CERTIFIED APPROACH SYSTEM

Where an OSAP is conducted to a non-moving offshore location (i.e. fixed installation or moored vessel), and an original equipment manufacturer (OEM)-certified approach system is available, the use of automation to reach a reliable GNSS position for that location should be used to enhance the safety of the OSAP.

The OSAP should meet the following requirements:

(a) The OEM-certified approach system should be approved in accordance with the applicable airworthiness requirements for operations at night and in IMC.

(b) The aircraft should be equipped with a radar altimeter and a suitable airborne radar.

(c) The GNSS position of the installation should be retrieved from the area navigation system database or by manual entry if the aircraft flight management system will allow for that.

(d) The approach system vertical path should be a Baro VNAV or a GNSS SBAS vertical source type. The radar height should be cross-checked (either automatically or by the crew) to avoid erroneous QNH selection.

(e) The descent angle should be of a maximum of 4°. Up to 6° could be acceptable only if the GS is reduced to 60 kt.

(f) The minimum descent height (MDH) should not be less than 50ft above the elevation of the helideck:

  (1) the MDH for an approach should not be lower than:

    (i) 200ft by day; or

    (ii) 300ft by night; and

  (2) the MDH for an approach leading to a circling manoeuvre should not be lower than:

    (i) 300ft by day; or

    (ii) 500ft by night.

(g) The minimum descent altitude (MDA) may only be used if the radio altimeter is unserviceable. The MDA should be a minimum of the MDH + 200ft and should be based on a calibrated barometer at destination or on the lowest forecast barometric pressure adjusted to sea level (QNH) for the region.

(h) The MDA/H for a single-pilot ARA should be 100ft higher than that calculated in accordance with (f) and (g) above. The decision range should not be less than 1 NM.

(i) The approach system lateral path guidance should be capable of at least performance monitoring and alerting function of RNP 0.3 NM up to the missed approach point (MAPt, then RNP 1.0 NM to missed approach holding point.)

(j) The horizontal flight path should be defined in accordance with the RNP capability of the approach system (e.g. offset no lower than the RNP capability).

(k) The maximum acceptable offset angle between the final inbound course and the installation should be 30°.

(l) Before commencing the final approach, the pilot-in-command/commander should ensure that a clear path exists on the radar screen for the final and missed approach segments. If lateral clearance from any obstacle is less than the navigation performance, the pilot-in-command/commander should:

  (1) approach to a nearby target structure and thereafter proceed visually to the destination structure; or

  (2) make the approach from another direction leading to a circling manoeuvre.

(m) The minimum decision range (MDR) should not be less than 0.75NM. The maximum acceptable GS at the MAPt for a 0.75-NM MDR should be 80 kt.

(n) The segment from the MAPt to destination should not be flown in tailwind conditions. The approach course should be selectable accordingly.

(o) The aircraft should have the capability to compare the airborne radar picture and GNSS range and bearing data to cross-check the position of the offshore location.

The following AMC1 SPA.HOFO.125(g) is inserted:

AMC1 SPA.HOFO.125(g) Offshore standard approach procedures (OSAPs)

TRAINING AND CHECKING FOR OSAPs

(a) Initial training and checking for OSAPs should be conducted either as part of the operator's conversion course or as a separate equipment and procedure training, and should include all of the following:

(1) ground training, including knowledge of:

(i) the structure of the OSAP;

(ii) the airborne radar specifications, limitations, modes, and usage;

(iii) the area navigation system, as necessary for the envisaged OSAP;

(2) aircraft/FSTD training, including all of the following:

(i) OSAPs to various offshore sites with and without obstacles or obstructions;

(ii) OSAPs in different wind conditions, followed by landings and go-arounds;

(iii) OSAPs in the pilot-monitoring, pilot-flying and single-pilot functions, by day and by night, as relevant to the kind of operations;

(3) LIFUS;

(4) line check.

(b) The recurrent training and checking programme should include at least one OSAP per year in the pilot-monitoring, pilot-flying and single-pilot functions as relevant to the kind of operations. OSAPs should be part of the annual aircraft/FSTD training, the line check or the operator's proficiency check. Checking is not necessary if training to proficiency is employed.

The title of GM1 SPA.HOFO.125 is replaced by the following:

GM1 SPA.HOFO.125 ~~Airborne radar approach (ARA) to offshore locations~~ Offshore standard approach procedures (OSAPs)

~~GENERAL~~ AIRBORNE RADAR APPROACH (ARA)

[...]

The title of GM2 SPA.HOFO.125 is replaced by the following:

GM2 SPA.HOFO.125 ~~Airborne radar approach (ARA) to offshore locations~~ Offshore standard approach procedures (OSAPs)

GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)/AREA NAVIGATION SYSTEM — AIRBORNE RADAR APPROACH (ARA)

[…]

(c) ~~operation of the GNSS equipment in terminal mode;~~ the full-scale deviation of the GNSS/area navigation system display should be in accordance with the expected navigation performance, and be no greater than 1 NM;

<u>Annex VI – Part NCC</u>

Annex VI is amended as follows:

The following GM1 NCC.OP.101 is inserted:

GM1 NCC.OP.101 Altimeter check and settings

ALTIMETER SETTING PROCEDURES

The following paragraphs of ICAO Doc 8168 (PANS-OPS), Volume III provide recommended guidance on how to develop the altimeter setting procedure:

(a) 3.2 'Pre-flight operational test';

(b) 3.3 'Take-off and climb';

(c) 3.5 'Approach and landing'.

The following GM1 NCC.OP.105 is inserted:

GM1 NCC.OP.105 Specification of isolated aerodromes - aeroplanes

USE OF AN AERODROME AS AN ISOLATED AERODROME

The concept of an isolated aerodrome allows the operator to use aerodromes that would otherwise be impossible or impractical to use with sufficient fuel to fly to the destination aerodrome and then to a destination alternate aerodrome, provided that operational criteria are used to ensure a safe-landing option, for example by specifying a PNR. If alternate fuel is carried, the operator is not required to consider the aerodrome isolated and use the aforementioned operational criteria.

AMC3 NCC.OP.110 is replaced by the following:

AMC3 NCC.OP.110 Aerodrome operating minima — general

TAKE-OFF OPERATIONS

(a) General:

(1) Take-off minima should be expressed as visibility (VIS) or RVR limits, taking into account all relevant factors for each aerodrome planned to be used and aircraft characteristics and equipment. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions, e.g. ceiling, should be specified.

(2) The pilot-in-command should not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than applicable minima for landing at that aerodrome, unless a weather-permissible take-off alternate aerodrome is available.

(3) When the reported meteorological visibility VIS is below that required for take-off and the RVR is not reported, a take-off should only be commenced if the pilot-in-command can determine that the visibility along the take-off runway/area is equal to or better than the required minimum.

(4) When no reported meteorological visibility VIS or RVR is available, a take-off should only be commenced if the pilot-in-command can determine that the visibility RVR/ VIS along the take-off runway/area is equal to or better than the required minimum.

(b) Visual reference:

(1) The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and a continued take-off after failure of the critical engine.

(2) For night operations, ground lights should be available to illuminate the runway/final approach and take-off area (FATO) and any obstacles the prescribed runway lights should be in operation to mark the runway and any obstacles.

(c) Required RVR/ or VISvisibility:

(1) Aeroplanes:

(i) For aeroplanes, the take-off minima specified by the operator should be expressed as RVR/VIS values not lower than those specified in Table 1.A.

(ii) When reported RVR or meteorological visibility is not available, the pilot-in-command should not commence take-off unless he/she can determine that the actual conditions satisfy the applicable take-off minima.

(i) For multi-engined aeroplanes, with such performance that in the event of a critical engine failure at any point during take-off the aeroplane can either stop or continue the take-off to a height of 1 500ft above the aerodrome while clearing obstacles by the required margins, the take-off minima specified by the operator should be expressed as RVR or VIS values not lower than those specified in Table 1.

(ii) Multi-engined aeroplanes without the performance to comply with the conditions in (c)(1)(i) in the event of a critical engine failure may need to re-land immediately and to see and avoid obstacles in the take-off area. Such aeroplanes may be operated to the following take-off minima provided that they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the specified height:

(A) The take-off minima specified by the operator should be based on the height from which the one-engine-inoperative (OEI) net take-off flight path can be constructed.

(B) The RVR minima used should not be lower than either of the values specified in Table 1 or Table 2.

(iii) For single-engined complex aeroplane operations, the take-off minima specified by the operator should be expressed as RVR/CMV values not lower than those specified in Table 1 below.

Unless the operator is using a risk period, whenever the surface in front of the runway does not allow for a safe forced landing, the RVR values should not be lower than 800m. In this case, the proportion of the flight to be considered starts at the lift-off position and ends when the aeroplane is able to turn back and land on the runway in the opposite direction or glide to the next landing site in case of power loss.

(iv) When the RVR or the VIS is not available, the commander should not commence take-off unless he or she can determine that the actual conditions satisfy the applicable take-off minima.

Table 1~~.A~~

Take-off — aeroplanes (without ~~low visibility take-off (~~LVTO~~)~~ approval)

RVR~~/~~ or VIS

Facilities	RVR~~/~~ or VIS (m)*
Day only: Nil**	500
Day: at least runway edge lights or runway ~~centreline~~ centre line markings Night: at least runway edge lights or runway ~~centreline~~ centre line lights and runway end lights	400

*: The reported RVR~~/~~ or VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

**: The pilot is able to continuously identify the take-off surface and maintain directional control.

Table 2

Take-off — aeroplanes (without LVTO approval)

Assumed engine failure height above the runway versus RVR or VIS

Assumed engine failure height above the take-off runway (ft)	RVR or VIS (m) *
<50	400
51–100	400
101–150	400
151–200	500

201–300	1 000
>300 or if no positive take-off flight path can be constructed	1 500

*: The reported RVR or VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

(2) Helicopters:

(i) For helicopters having a mass where it is possible to reject the take-off and land on the FATO in case of the critical engine failure being recognised at or before the take-off decision point (TDP), the operator should specify an RVR or /VIS as take-off minima in accordance with Table 31.H.

(ii) For all other cases, the pilot-in-command should operate to take-off minima of 800m RVR or /VIS and remain clear of cloud during the take-off manoeuvre until reaching the performance capabilities of (c)(2)(i).

(iii) For point-in-space (PinS) departures to an initial departure fix (IDF), the take-off minima should be selected to ensure sufficient guidance to see and avoid obstacles and return to the heliport if the flight cannot continue visually to the IDF.

~~(iii) Table 5 for converting reported meteorological visibility to RVR should not be used for calculating take-off minima.~~

Table 31.H

Take-off — helicopters (without LVTO approval)

RVR/ Visibility or VIS

Onshore aerodromes or operating sites with instrument flight rules (IFR) departure procedures	**RVR/ or VIS (m)****
No light and no markings (day only)	400 or the rejected take-off distance, whichever is the greater
No markings (night)	800
Runway edge/FATO light and ~~centreline~~ centre line marking	400
Runway edge/FATO light, ~~centreline~~ centre line marking and relevant RVR information	400
Offshore helideck *	
Two-pilot operations	400
Single-pilot operations	500

*: The take-off flight path to be free of obstacles.

** On PinS departures to IDF, VIS should not be less than 800 m and the ceiling should not be less than 250ft.

AMC4 NCC.OP.110 is replaced by the following:

AMC4 NCC.OP.110 Aerodrome operating minima — general

CRITERIA FOR ESTABLISHING RVR/CMV

(a) In order to qualify for the lowest allowable values of RVR/CMV specified in Table 4.A, the instrument approach should meet at least the following facility requirements and associated conditions:

(1) Instrument approaches with designated vertical profile up to and including 4.5° for Category A and B aeroplanes, or 3.77° for Category C and D aeroplanes, where the facilities are:

(i) instrument landing system (ILS)/microwave landing system (MLS)/GBAS landing system (GLS)/precision approach radar (PAR); or

(ii) approach procedure with vertical guidance (APV); and

where the final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes.

(2) Instrument approach operations flown using the CDFA technique with a nominal vertical profile, up to and including 4.5° for Category A and B aeroplanes, or 3.77° for Category C and D aeroplanes, where the facilities are non-directional beacon (NDB), NDB/distance measuring equipment (DME), VHF omnidirectional radio range (VOR), VOR/DME, localiser (LOC), LOC/DME, VHF direction finder (VDF), surveillance radar approach (SRA) or global navigation satellite system (GNSS)/lateral navigation (LNAV), with a final approach segment of at least 3 NM, which also fulfil the following criteria:

(i) the final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes;

(ii) the final approach fix (FAF) or another appropriate fix where descent is initiated is available, or distance to threshold (THR) is available by flight management system (FMS)/area navigation (NDB/DME) or DME; and

(iii) the missed approach point (MAPt) is determined by timing, the distance from FAF to THR is ≤ 8 NM.

(3) Instrument approaches where the facilities are NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA or GNSS/LNAV, not fulfilling the criteria in (a)(2), or with an minimum descent height (MDH) ≥ 1 200 ft.

(b) The missed approach operation, after an approach operation has been flown using the CDFA technique, should be executed when reaching the decision height/altitude (DH/A) or the MAPt, whichever occurs first. The lateral part of the missed approach procedure should be flown via the MAPt unless otherwise stated on the approach chart.

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The decision height (DH) to be used for a 3D approach operation or a 2D approach operation flown using the continuous descent final approach (CDFA) technique should not be lower than the highest of:

(1) the obstacle clearance height (OCH) for the category of aircraft;

(2) the published approach procedure DH or minimum descent height (MDH) where applicable;

(3) the system minima specified in Table 4;

(4) the minimum DH permitted for the runway specified in Table 5; or

(5) the minimum DH specified in the AFM or equivalent document, if stated.

(b) The MDH for a 2D approach operation flown not using the CDFA technique should not be lower than the highest of:

(1) the OCH for the category of aircraft;

(2) the published approach procedure MDH where applicable;

(3) the system minima specified in Table 4;

(4) the lowest MDH permitted for the runway specified in Table 5; or

(5) the lowest MDH specified in the AFM, if stated.

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

(c) The DH or MDH should not be lower than the highest of:

(1) the OCH for the category of aircraft used;

(2) the published approach procedure DH or MDH where applicable;

(3) the system minima specified in Table 4;

(4) the lowest DH or MDH permitted for the runway/FATO specified in Table 6 if applicable; or

(5) the lowest DH or MDH specified in the AFM, if stated.

Table 4

System minima — all aircraft

Facility	**Lowest DH/MDH (ft)**
ILS/MLS/GLS	200
GNSS/SBAS (LPV)	200*
Precision approach radar (PAR)	200
GNSS/SBAS (LP)	250
GNSS (LNAV)	250
GNSS/Baro VNAV (LNAV/VNAV)	250
Helicopter PinS approach	250**
LOC with or without DME	250
SRA (terminating at ½ NM)	250
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350
VOR	300
VOR/DME	250
NDB	350

Facility	Lowest DH/MDH (ft)
NDB/DME	300
VDF	350

* For localiser performance with vertical guidance (LPV), a DH of 200ft may be used only if the published final approach segment (FAS) datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250ft.

** For PinS approaches with instructions to ‘proceed VFR’ to an undefined or virtual destination, the DH or MDH should be with reference to the ground below the MAPt.

Table 5

Runway type minima — aeroplanes

Runway type	**Lowest DH/MDH (ft)**
Precision approach (PA) runway, category I	200
NPA runway	250
Non-instrument runway	Circling minima as shown in Table 1 in NCC.OP.112

Table 6

Type of runway/FATO versus lowest DH/MDH — helicopters

Type of runway/FATO	**Lowest DH/MDH (ft)**
PA runway, category I NPA runway Non-instrument runway	200
Instrument FATO	200
FATO	250

Table 6 does not apply to helicopter PinS approaches with instructions to 'proceed VFR'

AMC5 NCC.OP.110 is replaced by the following:

AMC5 NCC.OP.110 Aerodrome operating minima

DETERMINATION OF RVR OR VIS ~~RVR/CMV/VISMINIMA FOR NPA, APV, CAT I~~ FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

~~(a) The minimum RVR/CMV/VIS should be the highest of the values specified in Table 3 and Table 4.A but not greater than the maximum values specified in Table 4.A, where applicable.~~

~~(b) The values in Table 3 should be derived from the formula below:~~

~~required RVR/VIS (m) = [(DH/MDH (ft) x 0.3048) / tanα] – length of approach lights (m);~~

~~where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 3 up to 3.77° and then remaining constant.~~

~~(c) If the approach is flown with a level flight segment at or above MDA/H, 200 m should be added for Category A and B aeroplanes and 400 m for Category C and D aeroplanes to the minimum RVR/CMV/VIS value resulting from the application of Table 3 and Table 4.A.~~

~~(d) An RVR of less than 750 m as indicated in Table 3 may be used:~~

~~(1) for CAT I operations to runways with full approach lighting system (FALS), runway touchdown zone lights (RTZL) and runway centreline lights (RCLL);~~

~~(2) for CAT I operations to runways without RTZL and RCLL when using an approved head-up guidance landing system (HUDLS), or equivalent approved system, or when conducting a coupled approach or flight-director-flown approach to a DH. The ILS should not be published as a restricted facility; and~~

(3) for APV operations to runways with FALS, RTZL and RCLL when using an approved head-up display (HUD).

(e) Lower values than those specified in Table 3 may be used for HUDLS and autoland operations if approved in accordance with Annex V (Part SPA), Subpart E.

(f) The visual aids should comprise standard runway day markings and approach and runway lights as specified in Table 2. The CAA may approve that RVR values relevant to a basic approach lighting system (BALS) are used on runways where the approach lights are restricted in length below 210 m due to terrain or water, but where at least one cross-bar is available.

(g) For night operations or for any operation where credit for runway and approach lights is required, the lights should be on and serviceable, except as provided for in Table 6.

(h) For single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:

(1) an RVR of less than 800 m as indicated in Table 3 may be used for CAT I approaches provided any of the following is used at least down to the applicable DH:

(i) a suitable autopilot, coupled to an ILS, MLS or GLS that is not published as restricted; or

(ii) an approved HUDLS, including, where appropriate, enhanced vision system (EVS), or equivalent approved system;

(2) where RTZL and/or RCLL are not available, the minimum RVR/CMV should not be less than 600 m; and

(3) an RVR of less than 800 m as indicated in Table 3 may be used for APV operations to runways with FALS, RTZL and RCLL when using an approved HUDLS, or equivalent approved system, or when conducting a coupled approach to a DH equal to or greater than 250 ft.

Table 2: Approach lighting systems

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centreline, Barrette centreline
IALS	Simple approach lighting system (HIALS 420 – 719 m) single source, Barrette
BALS	Any other approach lighting system (HIALS, MIALS or ALS 210 – 419 m)
NALS	Any other approach lighting system (HIALS, MIALS or ALS < 210 m) or no approach lights

Note: HIALS: high intensity approach lighting system;
MIALS: medium intensity approach lighting system;
ALS: approach lighting system.

Table 3: RVR/CMV vs. DH/MDH

DH or MDH			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			See (d), (e), (h) above for RVR < 750/800 m			
ft			**RVR/CMV (m)**			
200	-	210	550	750	1 000	1 200

DH or MDH			Class of lighting facility			
			FALS	IALS	BALS	NALS
			See (d), (e), (h) above for RVR < 750/800 m			
ft			RVR/CMV (m)			
211	-	220	550	800	1 000	1 200
221	-	230	550	800	1 000	1 200
231	-	240	550	800	1 000	1 200
241	-	250	550	800	1 000	1 300
251	-	260	600	800	1 100	1 300
261	-	280	600	900	1 100	1 300
281	-	300	650	900	1 200	1 400
301	-	320	700	1 000	1 200	1 400
321	-	340	800	1 100	1 300	1 500
341	-	360	900	1 200	1 400	1 600
361	-	380	1 000	1 300	1 500	1 700
381	-	400	1 100	1 400	1 600	1 800
401	-	420	1 200	1 500	1 700	1 900
421	-	440	1 300	1 600	1 800	2 000
441	-	460	1 400	1 700	1 900	2 100
461	-	480	1 500	1 800	2 000	2 200
481		500	1 500	1 800	2 100	2 300
501	-	520	1 600	1 900	2 100	2 400
521	-	540	1 700	2 000	2 200	2 400
541	-	560	1 800	2 100	2 300	2 500
561	-	580	1 900	2 200	2 400	2 600
581	-	600	2 000	2 300	2 500	2 700
601	-	620	2 100	2 400	2 600	2 800
621	-	640	2 200	2 500	2 700	2 900
641	-	660	2 300	2 600	2 800	3 000
661	-	680	2 400	2 700	2 900	3 100
681	-	700	2 500	2 800	3 000	3 200
701	-	720	2 600	2 900	3 100	3 300
721	-	740	2 700	3 000	3 200	3 400
741	-	760	2 700	3 000	3 300	3 500
761	-	800	2 900	3 200	3 400	3 600
801	-	850	3 100	3 400	3 600	3 800
851	-	900	3 300	3 600	3 800	4 000
901	-	950	3 600	3 900	4 100	4 300
951	-	1 000	3 800	4 100	4 300	4 500
1 001	-	1 100	4 100	4 400	4 600	4 900
1 101	-	1 200	4 600	4 900	5 000	5 000
1 201 and above			5 000	5 000	5 000	5 000

Table 4.A: CAT I, APV, NPA – aeroplanes

Minimum and maximum applicable RVR/CMV (lower and upper cut-off limits)

Facility/conditions	RVR/CMV (m)	Aeroplane category			
		A	B	C	D
ILS, MLS, GLS, PAR, GNSS/SBAS, GNSS/VNAV	Min	According to Table 3			
	Max	1 500	1 500	2 400	2 400
	Min	750	750	750	750

~~Facility/conditions~~	~~RVR/CMV (m)~~	~~Aeroplane category~~			
		~~A~~	~~B~~	~~C~~	~~D~~
~~ILS, MLS, GLS, PAR, GNSS/SBAS, GNSS/VNAV~~	~~Min~~	~~According to Table 3~~			
	~~Max~~	~~1 500~~	~~1 500~~	~~2 400~~	~~2 400~~
~~NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV with a procedure that fulfils the criteria in AMC4 NCC.OP.110 (a)(2).~~	~~Max~~	~~1 500~~	~~1 500~~	~~2 400~~	~~2 400~~
~~For NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV:~~ ~~— not fulfilling the criteria in AMC4 NCC.OP.110 (a)(2)., or~~ ~~— with a DH or MDH ≥ 1 200 ft~~	~~Min~~	~~1 000~~	~~1 000~~	~~1 200~~	~~1 200~~
	~~Max~~	~~According to Table 3 if flown using the CDFA technique, otherwise an add-on of 200/400 m applies to the values in Table 3 but not to result in a value exceeding 5 000 m.~~			

(a) The RVR or VIS for straight-in instrument approach operations should not be less than the greatest of the following:

(1) the minimum RVR or VIS for the type of runway used according to Table 7; or

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 8; or

(3) the minimum RVR according to the visual and non-visual aids and on-board equipment used according to Table 9.

If the value determined in (1) is a VIS, then the result is a minimum VIS. In all other cases, the result is a minimum RVR.

(b) For Category A and B aeroplanes, if the RVR or VIS determined in accordance with point (a) is greater than 1 500m, then 1 500m should be used.

(c) If the approach is flown with a level flight segment at or above the MDA/H, then 200m should be added to the RVR calculated in accordance with (a) and (b) for Category A and B aeroplanes and 400m should be added to the RVR calculated in accordance with (a) for Category C and D aeroplanes.

(d) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights, runway end lights and approach lights as defined in Table 10.

Table 7

Type of runway versus minimum RVR or VIS — aeroplanes

Type of runway	Minimum RVR or VIS (m)
PA runway, category I	RVR 550
NPA runway	RVR 750
Non-instrument runway	VIS according to Table 1 in NCC.OP.112 (Circling minima)

Table 8

RVR versus DH/MDH

DH or MDH (ft)			Class of lighting facility			
			FALS	IALS	BALS	NALS
			RVR (m)			
200	-	210	550	750	1 000	1 200
211	-	240	550	800	1 000	1 200
241	-	250	550	800	1 000	1 300
251	-	260	600	800	1 100	1 300
261	-	280	600	900	1 100	1 300
281	-	300	650	900	1 200	1 400
301	-	320	700	1 000	1 200	1 400
321	-	340	800	1 100	1 300	1 500
341	-	360	900	1 200	1 400	1 600
361	-	380	1 000	1 300	1 500	1 700
381	-	400	1 100	1 400	1 600	1 800
401	-	420	1 200	1 500	1 700	1 900
421	-	440	1 300	1 600	1 800	2 000
441	-	460	1 400	1 700	1 900	2 100
461	-	480	1 500	1 800	2 000	2 200
481	-	500	1 500	1 800	2 100	2 300
501	-	520	1 600	1 900	2 100	2 400
521	-	540	1 700	2 000	2 200	2 400
541	-	560	1 800	2 100	2 300	2 400
561	-	580	1 900	2 200	2 400	2 400
581	-	600	2 000	2 300	2 400	2 400
601	-	620	2 100	2 400	2 400	2 400
621	-	640	2 200	2 400	2 400	2 400
641	-	660	2 300	2 400	2 400	2 400
661	and above		2 400	2 400	2 400	2 400

Table 9

Visual and non-visual aids and/or on-board equipment versus minimum RVR — multi-pilot aeroplanes

Type of approach	Facilities	Lowest RVR	
		Multi-pilot operations	**Single-pilot operations**
3D operations Final approach track offset ≤15º for category A and B aeroplanes or ≤5º for Category C and D aeroplanes	runway touchdown zone lights (RTZL) and runway centre line lights (RCLL)	No limitation	
	without RTZL and RCLL but using HUDLS or equivalent system; without RTZL and RCLL but using autopilot or flight director to the DH	No limitation	600
	No RTZL and RCLL, not using HUDLS or equivalent system or autopilot to the DH	750m	800
3D operations	runway touchdown zone lights (RTZL) and runway centre line lights (RCLL) and final approach track offset >15º for Category A and B aeroplanes or final approach track offset > 5º for Category C and D aeroplanes	800m	1 000m
	without RTZL and RCLL but using HUDLS or equivalent system; autopilot or flight director to the DH and Final approach track offset > 15º for Category A and B aeroplanes or Final approach track offset > 5º for Category C and D aeroplanes	800m	1 000m
2D operations	Final approach track offset ≤15º for category A and B aeroplanes or ≤5º for Category C and D aeroplanes	750m	800m
	Final approach track offset >15º for Category A and B aeroplanes	1 000m	1 000m
	Final approach track offset > 5º for Category C and D aeroplanes	1 200m	1 200m

Table 10

Approach lighting systems — aeroplanes

Class of lighting facility	Length, configuration and intensity of approach lights
FALS	CAT I lighting system (HIALS ≥720m) distance coded centre line, barrette centre line
IALS	Simple approach lighting system (HIALS 420–719m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419m)
NALS	Any other approach lighting system (HIALS, MALS or ALS <210m) or no approach lights

(e) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable except as provided for in Table 15.

(f) Where any visual or non-visual aid specified for the approach and assumed to be available in the determination of operating minima is unavailable, revised operating minima will need to be determined.

AMC6 NCC.OP.110 is replaced by the following:

AMC6 NCC.OP.110 Aerodrome operating minima — general

DETERMINATION OF RVR~~/CMV/~~OR VIS ~~MINIMA~~ FOR ~~NPA,~~ TYPE A INSTRUMENT APPROACH AND TYPE B CAT I INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

~~(a) For non-precision approach (NPA) operations the minima specified in Table 4.1.H should apply:~~

~~(1) where the missed approach point is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required;~~

~~(2) for night operations, ground lights should be available to illuminate the FATO/runway and any obstacles; and~~

~~(3) for single-pilot operations, the minimum RVR is 800 m or the minima in Table 4.2.H, whichever is higher.~~

~~(b) For CAT I operations, the minima specified in Table 4.2.H should apply:~~

~~(1) for night operations, ground light should be available to illuminate the FATO/runway and any obstacles;~~

~~(2) for single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:~~

~~(i) an RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, MLS or GLS, in which case normal minima apply; and~~

~~(ii) the DH applied should not be less than 1.25 times the minimum use height for the autopilot.~~

~~**Table 4.1.H: Onshore minima**~~

~~MDH /DH (ft) *~~	~~Approach lighting systems vs RVR/CMV (m) **, ***~~			
	~~FALS~~	~~IALS~~	~~BALS~~	~~NALS~~
~~250–299~~	~~600~~	~~800~~	~~1 000~~	~~1 000~~
~~300–449~~	~~800~~	~~1 000~~	~~1 000~~	~~1 000~~
~~450 and above~~	~~1 000~~	~~1 000~~	~~1 000~~	~~1 000~~

~~*: 'MDH/DH' refers to the initial calculation of MDH/DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to MDA/DA.~~

~~**: The tables are only applicable to conventional approaches with a nominal descent slope of not greater than 4°. Greater descent slopes will usually require that visual glideslope guidance (e.g. precision approach path indicator (PAPI)) is also visible at the MDH.~~

~~**Table 4.2.H: Onshore CAT I minima**~~

~~**DH (ft) ***~~	~~**Approach lighting systems vs RVR/CMV (m) **, *****~~			
	~~**FALS**~~	~~**IALS**~~	~~**BALS**~~	~~**NALS**~~
~~200~~	~~500~~	~~600~~	~~700~~	~~1 000~~
~~201–250~~	~~550~~	~~650~~	~~750~~	~~1 000~~
~~251–300~~	~~600~~	~~700~~	~~800~~	~~1 000~~
~~301 and above~~	~~750~~	~~800~~	~~900~~	~~1 000~~

~~*: ‘DH’ refers to the initial calculation of DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to DA.~~

~~**: The table is applicable to standard approaches with a glide slope up to and including 4°.~~

(a) For IFR operations, the RVR or VIS should not be less than the greatest of:

(1) the minimum RVR or VIS for the type of runway/FATO used according to Table 11;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 12; or

(3) for PinS operations with instructions to ‘proceed visually’, the distance between the MAPt of the PinS and the FATO or its approach light system.

If the value determined in (1) is a VIS, then the result is a minimum VIS. In all other cases, the result is a minimum RVR.

(b) For PinS operations with instructions to ‘proceed VFR’, the VIS should be compatible with visual flight rules.

(c) For type A instrument approaches where the MAPt is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required.

(d) An RVR of less than 800m should not be used except when using a suitable autopilot coupled to an ILS, MLS, GLS or LPV, in which case normal minima apply.

(e) For night operations, ground lights should be available to illuminate the FATO/runway and any obstacles.

(f) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights and runway end lights and approach lights as specified in Table 13.

(g) For night operations or for any operation where credit for runway and approach lights as defined in Table 13 is required, the lights should be on and serviceable except as provided for in Table 15.

Table 11

Type of runway/FATO versus minimum RVR or VIS — helicopters

Type of runway/FATO	Minimum RVR or VIS
PA runway, category I NPA runway Non-instrument runway	RVR 550m
Instrument FATO FATO	RVR 550m RVR or VIS 800m

Table 12

Onshore helicopter instrument approach minima

DH/MDH (ft)	Facilities versus RVR (m)			
	FALS	**IALS**	**BALS**	**NALS**
200	550	600	700	1 000
201–249	550	650	750	1 000
250–299	600*	700*	800	1 000
300 and above	750*	800	900	1 000

* Minima on 2D approach operations should be no lower than 800m.

Table 13

Approach lighting systems — helicopters

Class of lighting facility	Length, configuration and intensity of approach lights
FALS	CAT I lighting system (HIALS ≥ 720m) distance coded centre line, barrette centre line
IALS	Simple approach lighting system (HIALS 420–719m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419m)
NALS	Any other approach lighting system (HIALS, MALS or ALS < 210m) or no approach lights

AMC8 NCC.OP.110 is replaced by the following:

AMC8 NCC.OP.110 Aerodrome operating minima — general

CONVERSION OF ~~REPORTED METEOROLOGICAL~~ VISIBILITY TO ~~RVR/~~CMV — AEROPLANES

~~(a) A conversion from meteorological visibility to RVR/CMV should not be used:~~

~~(1) when the reported RVR is available;~~

~~(2) for calculating take-off minima; and~~

~~(3) for other RVR minima less than 800 m~~

~~(b) If the RVR is reported as being above the maximum value assessed by the aerodrome operator, e.g. 'RVR more than 1 500 m', it should not be considered as a reported value for (a)(1).~~

~~(c) When converting meteorological visibility to RVR in circumstances other than those in (a), the conversion factors specified in Table 5 should be used.~~

The following conditions should apply to the use of CMV instead of RVR:

(a) If the reported RVR is not available, a CMV may be substituted for the RVR, except:

(1) to satisfy take-off minima; or

(2) for the purpose of continuation of an approach in LVO.

(b) If the minimum RVR for an approach is more than the maximum value assessed by the aerodrome operator, then CMV should be used.

(c) In order to determine CMV from visibility:

(1) for flight planning purposes, a factor of 1.0 should be used;

(2) for purposes other than flight planning, the conversion factors specified in Table 14 should be used.

Table 14~~5~~

Conversion of reported ~~meteorological visibility~~ VIS to ~~RVR/~~CMV

Light elements in operation	**~~RVR/~~CMV = reported VIS x ~~meteorological visibility x~~**	
	Day	**Night**
HI approach and runway lights	1.5	2.0
Any type of light installation other than above	1.0	1.5
No lights	1.0	not applicable

AMC9 NCC.OP.110 is replaced by the following:

AMC9 NCC.OP.110 Aerodrome operating minima — general

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT

(a) General

These instructions are intended for both pre-flight and in-flight use. It is, however, not expected that the pilot-in-command would consult such instructions after passing 1 000 ft above the aerodrome. If failures of ground aids are announced at such a late stage, the approach could be continued at the pilot-in-command's discretion. If failures are announced before such a late stage in the approach, their effect on the approach should be considered as described in Table 15~~6~~ and, if considered necessary, the approach should be abandoned.

(b) Conditions applicable to Table 15~~6~~:

(1) multiple failures of runway/FATO lights other than those indicated in Table 15~~6~~ should not be acceptable;

(2) deficiencies of approach and runway/FATO lights are acceptable at the same time, and the most demanding consequence should be applied ~~treated separately~~; and

(3) failures other than ILS, GLS, or MLS affect the RVR only and not the DH.

Table 15~~6~~

Failed or downgraded equipment — effect on landing minima

Failed or downgraded equipment	Effect on landing minima	
	~~CAT I~~ Type B	**~~APV, NPA~~ Type A**
~~ILS/MLS~~Navaid standby transmitter	No effect	
Outer marker (ILS only)	No effect if ~~replaced by height check at 1 000 ft~~ the required height or glide path can be checked using other means, e.g. DME fix	APV — not applicable NPA with FAF: no effect unless used as FAF If the FAF cannot be identified (e.g. no method available for timing of descent), ~~non-precision~~ NPA operations cannot be conducted
Middle marker (ILS only)	No effect	No effect unless used as MAPt
RVR assessment systems	No effect	
Approach lights	Minima as for NALS	
Approach lights except the last 210m	Minima as for BALS	
Approach lights except the last 420m	Minima as for IALS	
Standby power for approach lights	No effect	
Edge lights, threshold lights and runway end lights	Day: no effect Night: not allowed	
~~Centreline~~ Centre line lights	Aeroplanes: No effect if flight director (F/D), HUDLS or autoland; otherwise, RVR 750m Helicopters: No effect on CAT I and SA CAT I approach operations	No effect
~~Centreline~~ Centre line lights spacing increased to 30m	No effect	
~~Touchdown zone~~ TDZ lights	Aeroplanes: No effect if F/D, HUDLS or autoland; otherwise, RVR 750m Helicopters: No effect	No effect
Taxiway lighting system	No effect	

GM1 NCC.OP.110 is replaced by the following:

GM1 NCC.OP.110 Aerodrome operating minima - general

AIRCRAFT CATEGORIES

(a) Aircraft categories should be based on the indicated airspeed at threshold (V_{AT}), which is equal to the stalling speed (V_{SO}) multiplied by 1.3 or where published 1-g (gravity) stall speed (V_{S1g}) multiplied by 1.23 in the landing configuration at the maximum certified landing mass. If both V_{SO} and V_{S1g} are available, the higher resulting V_{AT} should be used.

(b) The aircraft categories specified in the following table should be used.

Table 16 ~~1~~: Aircraft categories corresponding to V_{AT} values

Aircraft category	V_{AT}
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 following GM4 NCC.OP.110 is inserted:

GM4 NCC.OP.110 Aerodrome operating minima — general

APPROACH LIGHTING SYSTEMS — ICAO AND FAA SPECIFICATIONS

The following table provides a comparison of the ICAO and FAA specifications.

Table 17

Approach lighting systems — ICAO and FAA specifications

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	ICAO: CAT I lighting system (HIALS ≥ 720m) distance coded centre line, barrette centre line FAA: ALSF1, ALSF2, SSALR, MALSR, high- or medium-intensity and/or flashing lights, 720m or more
IALS	ICAO: simple approach lighting system (HIALS 420–719m) single source, barrette FAA: MALSF, MALS, SALS/SALSF, SSALF, SSALS, high- or medium-intensity and/or flashing lights, 420–719m
BALS	Any other approach lighting system (e.g. HIALS, MALS or ALS 210–419m) FAA: ODALS, high- or medium-intensity or flashing lights 210–419m
NALS	Any other approach lighting system (e.g. HIALS, MALS or ALS <210m) or no approach lights

The following GM5 NCC.OP.110 is inserted:

GM5 NCC.OP.110 Aerodrome operating minima — general

SBAS OPERATIONS

(a) SBAS LPV operations with a DH of 200 ft depend on an SBAS approved for operations down to a DH of 200ft.

(b) The following systems are in operational use or in a planning phase:

(1) European geostationary navigation overlay service (EGNOS), operational in Europe;

(2) wide area augmentation system (WAAS), operational in the USA;

(3) multi-functional satellite augmentation system (MSAS), operational in Japan;

(4) system of differential correction and monitoring (SDCM), planned by Russia;

(5) GPS-aided geo-augmented navigation (GAGAN) system, planned by India; and

(6) satellite navigation augmentation system (SNAS), planned by China.

The following GM6 NCC.OP.110 is inserted:

GM6 NCC.OP.110 Aerodrome operating minima — general

MEANS TO DETERMINE THE REQUIRED RVR BASED ON DH AND LIGHTING FACILITIES

The values in Table 8 are derived from the formula below:

RVR (m) = [(DH/MDH (ft) x 0.3048)/tanα] — length of approach lights (m),

where α is the calculation angle, being a default value of 3.00 increasing in steps of 0.10° for each line in Table 8 up to 3.77° and then remaining constant. An upper RVR limit of 2 400 m has been applied to the table.

The following GM7 NCC.OP.110 is inserted:

GM7 NCC.OP.110 Aerodrome operating minima — general

USE OF DH FOR NPAs FLOWN USING THE CDFA TECHNIQUE

The safety of the use of MDH as DH in CDFA operations has been verified by at least two independent analyses concluding that a CDFA using MDH as DH without any add-on is safer than the traditional step-down and level flight NPA operation. A comparison was made between the safety level of using MDH as DH without an add-on with the well-established safety level resulting from the ILS collision risk model (CRM). The NPA used was the most demanding, i.e. most tightly designed NPA, which offers the least additional margins. It should be noted that the design limits of the ILS approach design, e.g. the maximum glide path (GP) angle of 3,5 degrees, must be observed for the CDFA in order to keep the validity of the comparison.

There is a wealth of operational experience in the UK and Europe confirming the above-mentioned analytical assessments. It cannot be expected that each operator is able to conduct similar safety assessments, and this is not necessary. The safety assessments already performed take into account the most demanding circumstances at hand, like the most tightly designed NPA procedures and other 'worst-case scenarios'. The assessments naturally focus on cases where the controlling obstacle is located in the missed approach area.

However, it is necessary for operators to assess whether their cockpit procedures and training are adequate to ensure minimal height loss in case of a go-around manoeuvre. Suitable topics for the safety assessment required by each operator may include:

— understanding of the CDFA concept including use of the MDA/H as DA/H;
— cockpit procedures that ensure flight on speed, on path and with proper configuration and energy management;
— cockpit procedures that ensure gradual decision-making; and
— identification of cases where an increase of the DA/H may be necessary because of non-standard circumstances, etc.

The following GM8 NCC.OP.110 is inserted:

GM8 NCC.OP.110 Aerodrome operating minima — general

INCREMENTS SPECIFIED BY THE CAA

Additional increments to the published minima may be specified by the CAA to take into account certain operations, such as downwind approaches, single-pilot operations or approaches flown not using the CDFA technique.

The following GM9 NCC.OP.110 is inserted:

GM9 NCC.OP.110 Aerodrome operating minima — general

USE OF COMMERCIALLY AVAILABLE INFORMATION

When an operator uses commercially available information to establish aerodrome operating minima, the operator remains responsible for ensuring that the material used is accurate and suitable for its operation, and that the aerodrome operating minima are calculated in accordance with the method specified in Part C of its operations manual.

The operator should apply the procedures in ORO.GEN.205 'Contracted activities'.

The following GM10 NCC.OP.110 is inserted:

GM1 NCC.OP.110(b)(5) Aerodrome operating minima

VISUAL AND NON-VISUAL AIDS AND INFRASTRUCTURE

'Visual and non-visual aids and infrastructure' refers to all equipment and facilities required for the procedure to be used for the intended instrument approach operation. This includes but is not limited to lights, markings, ground- or space-based radio aids, etc.

AMC1 NCC.OP.111 is deleted:

~~AMC1 NCC.OP. 111 Aerodrome operating minima – NPA, APV, CAT I operations~~

~~NPA FLOWN WITH THE CDFA TECHNIQUE~~

~~The DA/DH used should take into account any add-on to the published minima as identified by the operator's management system and specified in the operations manual (aerodrome operating minima).~~

GM1 NCC.OP.112 is replaced by the following:

GM1 NCC.OP.112 Aerodrome operating minima — circling operations with aeroplanes

SUPPLEMENTAL INFORMATION

(a) The purpose of this ~~G~~guidance ~~M~~material is to provide operators with supplemental information regarding the application of aerodrome operating minima in relation to circling approaches.

(b) Conduct of flight — general~~:~~

(1) the MDH and ~~obstacle clearance height (~~OCH~~)~~ included in the procedure are referenced to aerodrome elevation;

(2) the MDA is referenced to mean sea level;

(3) for these procedures, the applicable visibility is the ~~meteorological visibility~~ VIS; and

(4) operators should provide tabular guidance of the relationship between height above threshold and the in-flight visibility required to obtain and sustain visual contact during the circling manoeuvre.

(c) Instrument approach followed by visual manoeuvring (circling) without prescribed tracks~~:~~

(1) When the aeroplane is on the initial instrument approach, before visual reference is stabilised, but not below the MDA/H — the aeroplane should follow the corresponding instrument approach procedure (IAP) until the appropriate instrument MAPt is reached.

(2) At the beginning of the level flight phase at or above the MDA/H, the instrument approach track ~~determined by the radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~ should be maintained until the pilot:

(i) estimates that, in all probability, visual contact with the runway of intended landing or the runway environment will be maintained during the entire circling procedure;

(ii) estimates that the aeroplane is within the circling area before commencing circling; and

(iii) is able to determine the aeroplane's position in relation to the runway of intended landing with the aid of the appropriate ~~external~~ visual references.

(3) If the pilot cannot comply with the conditions in (c)(2) at the MAPt ~~When reaching the published instrument MAPt and the conditions stipulated in (c)(2) are unable to be~~

~~established by the pilot~~, then a missed approach should be ~~carried out~~executed in accordance with ~~that~~ the ~~instrument approach procedure~~ IAP.

(4) After the aeroplane has left the track of the initial instrument approach, the flight phase outbound from the runway should be limited to an appropriate distance, which is required to align the aeroplane onto the final approach. Such manoeuvres should be conducted to enable the aeroplane to:

(i) ~~to~~ attain a controlled and stable descent path to the intended landing runway; and

(ii) ~~to~~ remain within the circling area and in ~~a~~ such a way that visual contact with the runway of intended landing or runway environment is maintained at all times.

(5) Flight manoeuvres should be carried out at an altitude/height that is not less than the circling MDA/H.

(6) Descent below the MDA/H should not be initiated until the threshold of the runway to be used has been appropriately identified. The aeroplane should be in a position to continue with a normal rate of descent and land within the ~~touchdown zone~~ TDZ.

(d) Instrument approach followed by a visual manoeuvring (circling) with prescribed track~~.~~

(1) The aeroplane should remain on the initial ~~instrument approach procedure~~ IAP until one of the following is reached:

(i) the prescribed divergence point to commence circling on the prescribed track; or

(ii) the MAPt.

(2) The aeroplane should be established on the instrument approach track ~~determined by the radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~ in level flight at or above the MDA/H at or by the circling manoeuvre divergence point.

[…]

(8) Unless otherwise specified in the procedure, final descent should not be commenced from the MDA/H until the threshold of the intended landing runway has been identified and the aeroplane is in a position to continue with a normal rate of descent to land within the ~~touchdown zone~~TDZ.

(e) Missed approach

(1) Missed approach during the instrument procedure prior to circling~~:~~

(i) if the missed approach procedure is required to be flown when the aeroplane is positioned on the instrument approach track ~~defined by radio navigation aids; RNAV, RNP, ILS, MLS or GLS~~and before commencing the circling manoeuvre, the published missed approach for the instrument approach should be followed; or

(ii) if the ~~instrument approach procedure~~ IAP is carried out with the aid of an ILS, an MLS or a stabilised approach (SAp), the MAPt associated with an ILS or an MLS procedure without glide path (GP-out procedure) or the SAp, where applicable, should be used.

[…]

The following NCC.OP.115 is inserted:

AMC1 NCC.OP.115 Departure and approach procedures

APPROACH FLIGHT TECHNIQUE — AEROPLANES

(a) All approach operations should be flown as SAp operations.

(b) The CDFA technique should be used for NPA procedures.

AMC2 NCC.OP.116 is replaced by the following:

AMC2 NCC.OP.116 Performance-based navigation – aeroplanes and helicopters

MONITORING AND VERIFICATION

[…]

(d) Altimetry settings for RNP APCH operations using Baro VNAV

[…]

(2) Temperature compensation

(i) For RNP APCH operations to LNAV/VNAV minima using Baro VNAV:

(A) […]

(B) when the temperature is within promulgated limits, the flight crew should not make compensation to the altitude at the FAF ~~and DA/H~~;

[…]

The following AMC1 NCC.OP.131 is inserted:

AMC1 NCC.OP.131 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy – aeroplanes and helicopters

FUEL/ENERGY PLANNING SCHEME

For the fuel/energy planning scheme , the amount of the required usable fuel for a flight should not be less than the sum of the following:

(a) taxi fuel that should take into account the local conditions at the departure aerodrome and the APU consumption;

(b) trip fuel that should include:

(1) fuel for take-off and climb from the aerodrome elevation to the initial cruising level/altitude, taking into account the expected departure routing;

(2) fuel from the top of climb to the top of descent, including any step climb/descent;

(3) fuel from the top of descent to the point where the approach procedure is initiated, taking into account the expected arrival routing; and

(4) fuel for making an approach and landing at the destination aerodrome;

(c) contingency fuel that should be:

(1) 5 % of the planned trip fuel or, in the event of in-flight re-planning, 5 % of the trip fuel for the remainder of the flight; or

(2) an amount to fly for 5 minutes at holding speed at 1 500 ft (450 m) above the destination aerodrome in standard conditions, whichever is higher;

(d) destination alternate fuel that should be:

(1) when the aircraft is operated with one destination alternate aerodrome:

(i) fuel for a missed approach from the applicable DA/H or MDA/H at the destination aerodrome to the missed-approach altitude, taking into account the complete missed approach procedure;

(ii) fuel for climb from the missed-approach altitude to the cruising level/altitude, taking into account the expected departure routing;

(iii) fuel for cruising from the top of climb to the top of descent, taking into account the expected routing;

(iv) fuel for descent from the top of descent to the point where the approach is initiated, taking into account the expected arrival routing; and

(v) fuel for making an approach and landing at the destination alternate aerodrome;

(2) when the aircraft is operated with no destination alternate aerodrome, the amount of fuel to hold for 15 minutes at 1 500 ft (450 m) in standard conditions above the destination aerodrome elevation;

(3) when the aerodrome of intended landing is an isolated aerodrome:

(i) for aeroplanes with reciprocating engines, the amount of fuel required to fly either for 45 minutes plus 15 % of the flight time planned for cruising, including the final reserve fuel/energy (FRF/energy), or for 2 hours, whichever is less; or

(ii) for turbine-engined aeroplanes, the amount of fuel required to fly for 2 hours with normal cruise consumption above the destination aerodrome, including the FRF/energy;

(e) for FRF/energy, comply with point NCC.OP.131(c)(5);

(f) additional fuel that should be the amount of fuel that allows the aircraft to proceed, in the event of an engine failure or loss of pressurisation, from the most critical point along the route to a fuel en-route alternate (fuel ERA) aerodrome in the relevant aeroplane configuration, hold there for 15 minutes at 1 500ft (450m) above the aerodrome elevation in standard conditions, make an approach, and land; (g) extra fuel if there are anticipated delays or specific operational constraints; and

(h) discretionary fuel, if required by the pilot-in-command.

The following AMC1 NCC.OP.140(a)(17) is inserted:

AMC1 NCC.OP.140(a)(17) Documents, manuals and information to be carried

APPROPRIATE METEOROLOGICAL INFORMATION

The appropriate meteorological information should be relevant to the planned operation, as specified in point (a) of point **MET.TR.215** of Annex V (Part-MET) to **UK Regulation (EU) 2017/373**, and comprise the following:

(a) the meteorological information that is specified in point (e) of point **MET.TR.215** of Part-MET; and

(b) supplemental meteorological information:

(1) information other than that specified in point (a), which should be based on data from certified meteorological service providers; or

(2) information from other reliable sources of meteorological information that should be evaluated by the operator.

The following GM1 NCC.OP.140(a)(17) is inserted:

GM1 NCC.OP.140(a)(17) Documents, manuals and information to be carried

DATA FROM CERTIFIIED METEOROLOGICAL SERVICE PROVIDERS

In the context of point (b)(1) of **AMC1 NCC.GEN.140(a)(17),** the operator may consider that any meteorological information that is provided by the organisation within the scope of the meteorological information included in the flight documentation defined in point (e) of **MET.TR.215** of Part-MET should originate only from authoritative sources or certified providers, and should not be transformed or tampered, except for the purpose of presenting the data in the correct format. The organisation's process should provide assurance that the integrity of such service is preserved in the data to be used by both flight crews and operators, regardless of their form**.**

The following GM2 NCC.OP.140(a)(17) is inserted:

GM2 NCC.OP.140(a)(17) Documents, manuals and information to be carried

INFORMATION FROM OTHER RELIABLE SOURCES OF METEOROLOGICAL INFORMATION

In the context of point (b)(2) of **AMC1 NCC.GEN.140(a)(17),** reliable sources of meteorological information are organisations that are able to provide an appropriate level of data assurance in terms of accuracy and integrity. The operator may consider in the evaluation that the organisation has a quality assurance system in place that covers source selection, acquisition/import, processing, validity period check, and distribution phase of data.

The following GM3 NCC.OP.140(a)(17) is inserted:

GM3 NCC.OP.140(a)(17) Documents, manuals and information to be carried

SUPPLEMENTAL METEOROLOGICAL INFORMATION AND SUPPLEMENTARY INFORMATION

Supplemental meteorological information: when operating under specific provisions and without the meteorological information from a certified service provider, the operator should use 'supplemental meteorological information', such as digital imagery. Related information can be found in point (e)(4) of **AMC1 CAT.OP.MPA.192**. Supplementary information: it is included in point (a) of **AMC1 CAT.GEN.MPA.180(a)(18)** and refers to meteorological information to be reported in specific cases such as freezing precipitation, blowing snow, thunderstorm, etc.

AMC1 NCC.OP.153 is replaced by the following:

AMC1 NCC.OP.153 Destination aerodromes — instrument approach operations

PBN OPERATIONS

~~The pilot-in-command should only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.~~

(a) When the operator intends to use PBN, the operator should either:

(1) demonstrate that the GNSS is robust against loss of capability; or

(2) select an aerodrome as a destination alternate aerodrome only if an IAP that does not rely on a GNSS is available either at that aerodrome or at the destination aerodrome.

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — AEROPLANES/HELICOPTERS

(b) The operator may demonstrate robustness against the loss of capability of the GNSS if all of the following criteria are met:

(1) At flight planning stage, SBAS or GBAS are expected to be available and used.

(2) The failure of a single receiver or system should not compromise the navigation capability required for the intended instrument approach.

(3) The temporary jamming of all GNSS frequencies should not compromise the navigation capability for the intended route. The operator should provide a procedure to deal with such cases unless other sensors are available to continue on the intended route.

(4) For helicopters only, the duration of a jamming event should be determined as follows:

(i) Considering the average speed and height of a helicopter flight, the duration of a jamming event may be considered to be less than 2 minutes.

(ii) The time needed for the GNSS system to re-start and provide the aircraft position and navigation guidance should also be considered.

(iii) Based on (i) and (ii) above, the operator should establish the duration of the loss of GNSS navigation data due to jamming. This duration should be no less than 3 minutes, and may be no longer than 4 minutes.

(5) The operator should ensure resilience to jamming for the duration determined in (4) above, as follows:

(i) If the altitude of obstacles on both sides of the flight path are higher than the planned altitude for a given segment of the flight, the operator should ensure that there is no excessive drift on either side by relying on navigation sensors such as an inertial system with performance in accordance with the intended function.

(ii) If (i) does not apply and the operator cannot rely on sensors other than GNSS, the operator should develop a procedure to ensure that a drift from the intended route during the jamming event has no adverse consequences on the safety of the flight. This procedure may involve air traffic services.

(6) The operator should ensure that no space weather event is predicted to disrupt GNSS reliability and integrity at both the destination and the alternate aerodromes.

(7) The operator should verify the availability of RAIM for all phases of flight based on GNSS, including navigation to the alternate aerodrome.

(8) The operator's MEL should reflect the elements in points (b)(1) and (b)(2).

OPERATIONAL CREDITS

(c) To comply with point NCC.OP.153, when the operator intends to use 'operational credits' (e.g. EFVS, SA CAT I, etc.), the operator should select an aerodrome as destination alternate aerodrome only if an approach procedure that does not rely on the same 'operational credit' is available either at that aerodrome or at the destination aerodrome.

The following GM2 NCC.OP.153 is inserted:

GM2 NCC.OP.153 Destination aerodromes — instrument approach operations

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — AEROPLANES/HELICOPTERS

(a) Redundancy of on-board systems ensures that no single on-board equipment failure (e.g. antenna, GNSS receiver, FMS, or navigation display failure) results in the loss of the GNSS capability.

(b) Any shadowing of the GNSS signal or jamming of all GNSS frequencies from the ground is expected to be of a very short duration and affect a very small area. Additional sensors or functions such as inertial coasting may be used during jamming events. Jamming should be considered on all segments of the intended route, including the approach.

(c) The availability of GNSS signals can be compromised if space weather events cause 'loss of lock' conditions and more than one satellite signal may be lost on a given GNSS frequency. Until space weather forecasts are available, the operator may use 'nowcasts' as short-term predictions for helicopter flights of short duration.

(d) SBAS also contributes to the mitigation of space weather effects, both by providing integrity messages and by correcting ionosphere-induced errors.

(e) Even though SBAS should be available and used, RAIM should remain available autonomously. In case of loss of the SBAS, the route and the approach to the destination or alternate aerodrome should still be flown with an available RAIM function.

(f) When available, GNSS based on more than one constellation and more than one frequency may provide better integrity and redundancy regarding failures in the space segment of GNSS, jamming, and resilience to space weather events.

AMC1 NCC.OP.155 is replaced by the following:

AMC1 NCC.OP.155 Refuelling with passengers embarking, on board or disembarking

OPERATIONAL PROCEDURES — AEROPLANES ~~GENERAL~~

(a) If passengers are on board when refuelling with:

(1) other than aviation gasoline (AVGAS); or

(2) wide-cut type fuel; or

(3) a mixture of these types of fuel,

ground servicing activities and work inside the aeroplane, such as catering and cleaning, should be conducted in such a manner that they do not create a hazard and allow emergency evacuation to take place through those aisles and exits intended for emergency evacuation.

(b) The deployment of integral aircraft stairs or the opening of emergency exits as a prerequisite to refuelling is not necessarily required.

~~**OPERATIONAL PROCEDURES — AEROPLANES**~~

(c) Operational procedures should specify that at least the following precautions are taken:

(1) one qualified person should remain at a specified location during fuelling operations with passengers on board. This qualified person should be capable of handling emergency procedures concerning fire protection and fire-fighting, handling communications and initiating and directing an evacuation;

(2) two-way communication should be established and should remain available by the aeroplane's inter-communication system or other suitable means between the ground crew supervising the refuelling and the qualified personnel on board the aeroplane; the involved personnel should remain within easy reach of the system of communication;

(3) crew members, personnel and passengers should be warned that refuelling will take place;

(4) 'fasten seat belts' signs should be off;

(5) 'no smoking' signs should be on, together with interior lighting to enable emergency exits to be identified;

(6) passengers should be instructed to unfasten their seat belts and refrain from smoking;

(7) the minimum required number of cabin crew should be on board and be prepared for an immediate emergency evacuation;

(8) if the presence of fuel vapour is detected inside the aeroplane, or any other hazard arises during refuelling, fuelling should be stopped immediately;

(9) the ground area beneath the exits intended for emergency evacuation and slide deployment areas, if applicable, should be kept clear at doors where stairs are not in position for use in the event of evacuation; and

(10) provision should be made for a safe and rapid evacuation.

~~**OPERATIONAL PROCEDURES — HELICOPTERS**~~

~~(d) Operational procedures should specify that at least the following precautions are taken:~~

~~(1) door(s) on the refuelling side of the helicopter remain closed;~~

~~(2) door(s) on the non-refuelling side of the helicopter remain open, weather permitting;~~

~~(3) fire fighting facilities of the appropriate scale be positioned so as to be immediately available in the event of a fire;~~

~~(4) sufficient personnel should be immediately available to move passengers clear of the helicopter in the event of a fire;~~

~~(5) sufficient qualified personnel be on board and be prepared for an immediate emergency evacuation;~~

~~(6) if the presence of fuel vapour is detected inside the helicopter, or any other hazard arises during refuelling, fuelling should be stopped immediately;~~

~~(7) the ground area beneath the exits intended for emergency evacuation be kept clear; and~~

~~(8) provision should be made for a safe and rapid evacuation.~~

The following AMC1 NCC.OP.155 is inserted:

AMC2 NCC.OP.155 Refuelling with passengers embarking, on board or disembarking

OPERATIONAL PROCEDURES — HELICOPTERS

When the helicopter rotors are stopped, the efficiency and speed of passengers disembarking from and re-embarking on board helicopters is such that disembarking before refuelling and re-embarking after refuelling is the general practice. However, if such operations are needed, the operator should refer to **AMC1 NCC.OP.157** and **AMC2 NCC.OP.157**. Operational procedures to be described in the operations manual (OM) should specify that at least the relevant precautions of the aforementioned AMC are taken.

The following AMC1 NCC.OP.157 is inserted:

AMC1 NCC.OP.157 Refuelling with engine(s) running and/or rotors turning - helicopters

OPERATIONAL PROCEDURES — NO PASSENGERS ON BOARD

Operational procedures in the OM should specify that at least the following precautions are taken:

(a) all necessary information should be exchanged in advance with the aerodrome operator, operating site operator, and refuelling operator;

(b) the procedures to be used by crew members should be defined;

(c) the procedures to be used by the operator's ground operations personnel that may be in charge of refuelling or assisting in emergency evacuations should be described;

(d) the operator's training programmes for crew members and for the operator's ground operations personnel should be described;

(e) the minimum distance between the helicopter turning parts and the refuelling vehicle or installations should be defined when the refuelling takes place outside an aerodrome or at an aerodrome where there are no such limitations;

(f) besides any rescue and firefighting services (RFFSs) that are required to be available by aerodrome regulations, an additional handheld fire extinguisher with the equivalent of 5 kg of dry powder should be immediately available and ready for use;

(g) a means for a two-way communication between the crew and the person in charge of refuelling should be defined and established;

(h) if fuel vapour is detected inside the helicopter, or any other hazard arises, refuelling/defuelling should be stopped immediately;

(i) one pilot should stay at the controls, constantly monitor the refuelling, and be ready to shut off the engines and evacuate at all times; and

(j) any additional precautions should be taken, as determined by the risk assessment.

The following AMC2 NCC.OP.157 is inserted:

AMC2 NCC.OP.157 Refuelling with engine(s) running and/or rotors turning - helicopters

OPERATIONAL PROCEDURES — PASSENGERS ON BOARD

In addition to AMC1 NCC.OP.157, for refuelling with passengers on board, operational procedures in the OM should specify that at least the following precautions are taken:

(a) the positioning of the helicopter and the corresponding helicopter evacuation strategy should be defined taking into account the wind as well as the refuelling facilities or vehicles;

(b) on a heliport, the ground area beneath the exits that are intended for emergency evacuation should be kept clear;

(c) an additional passenger briefing as well as instructions should be defined, and the 'No smoking' signs should be on unless 'No smoking' placards are installed;

(d) interior lighting should be set to enable identification of emergency exits;

(e) the use of doors during refuelling should be defined: doors on the refuelling side should remain closed, while doors on the opposite side should remain unlocked or, weather permitting, open, unless otherwise specified in the AFM;

(f) at least one suitable person capable of implementing emergency procedures for firefighting, communications, as well as for initiating and directing an evacuation, should remain at a specified location; this person should not be the qualified pilot at the controls or the person performing the refuelling; and

(g) unless passengers are regularly trained in emergency evacuation procedures, an additional crew member or ground crew member should be assigned to assist in the rapid evacuation of the passengers.

The following GM1 NCC.OP.157 is inserted:

GM1 NCC.OP.157 Refuelling with engine(s) running and/or rotors turning - helicopters

RISK ASSESSMENT

The risk assessment should explain why it is not practical to refuel with the engine(s) and rotors stopped, identify any additional hazards, and describe how the additional risks are controlled. Helicopter offshore operations (HOFO) are typical operations where the benefits should outweigh the risks if mitigation measures are taken.

Guidance on safe refuelling practices is contained in ICAO Doc 9137 *Airport Services Manual*, Parts 1 and 8.

The operator's risk assessment may include, but not be limited to, the following risks, hazards and mitigation measures:

(a) risk related to refuelling with rotors turning;

(b) risk related to the shutting down of the engines, including the risk of failures during start-up;

(c) environmental conditions, such as wind limitations, displacement of exhaust gases, and blade sailing;

(d) risk related to human factors and fatigue management, especially for single-pilot operations for long periods of time;

(e) risk mitigation, such as the safety features of the fuel installation, rescue and firefighting (RFF) capability, number of personnel members available, ease of emergency evacuation of the helicopter, etc.;

(f) assessment of the use of radio transmitting equipment;

(g) determination of the use of passenger seat belts;

(h) review of the portable electronic device (PED) policy; and

(i) if passengers are to disembark, consideration of their disembarking before rather than after the refuelling; and

(j) if passengers are to embark, consideration of their embarking after rather than before the refuelling.

The following GM1 NCC.OP.205(b) & (d) is inserted:

GM1 NCC.OP.205(b) & (d) Fuel/energy scheme – in-flight fuel/energy management policy

FINAL RESERVE FUEL/ENERGY PROTECTION

To ensure a safe landing, the pilot needs to protect the FRF/energy in accordance with point **NCC.OP.131(c)(3).** The objective of the FRF/energy protection is to ensure that a safe landing is made at any aerodrome or operating site when unforeseen circumstances may not allow to safely complete the flight, as originally planned.

When the FRF/energy can no longer be protected, then a fuel emergency needs to be declared, as per point **NCC.OP.205(d**), and any landing option explored (e.g. for aeroplanes, aerodromes not assessed by the operator, military aerodromes, closed runways), including deviating from rules, operational procedures, and methods in the interest of safety (as per point **CAT.GEN.MPA.105(b)).**

ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual* and the EASA *Fuel Manual* contain further detailed guidance on the development of a comprehensive in-flight fuel management policy and related procedures. For helicopters, the operating site may be different from the planned destination or alternate aerodrome.

The following GM1 NCC.OP.205(c) is inserted:

GM1 NCC.OP.205(c) Fuel/energy scheme – in-flight fuel/energy management policy

'MINIMUM FUEL/ENERGY DECLARATION

The 'MINIMUM FUEL' declaration informs the ATC that all planned landing options have been reduced to a specific aerodrome or operating site of intended landing, and for helicopters, that no other landing site is available. It also informs the ATC that any change to the existing clearance may result in landing with less than the planned FRF/energy. This is not an emergency situation but an indication that an emergency situation is possible, should any additional delay occur.

The pilot should not expect any form of priority handling as a result of a 'MINIMUM FUEL' declaration. However, the ATC should advise the flight crew of any additional expected delays, as well as coordinate with other ATC units when transferring the control of the aircraft, to ensure that the other ATC units are aware of the flight's fuel state.

ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual* (1st Edition, 2015) and the EASA *Fuel Manual* contain guidance on declaring 'MINIMUM FUEL'.

AMC1 NCC.OP.230 is replaced by the following:

AMC1 NCC.OP.230(a) Commencement and continuation of approach

~~VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS~~ MINIMUM RVR FOR CONTINUATION OF APPROACH — AEROPLANES

~~(a) NPA, APV and CAT I operations~~

~~At DH or MDH, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot:~~

~~(1) elements of the approach lighting system;~~

~~(2) the threshold;~~

~~(3) the threshold markings;~~

~~(4) the threshold lights;~~

~~(5) the threshold identification lights;~~

~~(6) the visual glide slope indicator;~~

~~(7) the touchdown zone or touchdown zone markings;~~

~~(8) the touchdown zone lights;~~

~~(9) FATO/runway edge lights; or~~

~~(10) other visual references specified in the operations manual.~~

~~(b) Lower than standard category I (LTS CAT I) operations~~

~~At DH, the visual references specified below should be distinctly visible and identifiable to the pilot:~~

(1) ~~a segment of at least three consecutive lights, being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of these; and~~

(2) ~~this visual reference should include a lateral element of the ground pattern, such as an approach light crossbar or the landing threshold or a barrette of the touchdown zone light unless the operation is conducted utilising an approved HUDLS usable to at least 150 ft.~~

(c) ~~CAT II or OTS CAT II operations~~

~~At DH, the visual references specified below should be distinctly visible and identifiable to the pilot:~~

(1) ~~a segment of at least three consecutive lights, being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of these; and~~

(2) ~~this visual reference should include a lateral element of the ground pattern, such as an approach light crossbar or the landing threshold or a barrette of the touchdown zone light unless the operation is conducted utilising an approved HUDLS to touchdown.~~

(d) ~~CAT III operations~~

(1) ~~For CAT IIIA operations and for CAT IIIB operations conducted either with fail-passive flight control systems or with the use of an approved HUDLS: at DH, a segment of at least three consecutive lights, being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of these is attained and can be maintained by the pilot.~~

(2) ~~For CAT IIIB operations conducted either with fail-operational flight control systems or with a fail-operational hybrid landing system using a DH: at DH, at least one centreline light is attained and can be maintained by the pilot.~~

(3) ~~For CAT IIIB operations with no DH there is no requirement for visual reference with the runway prior to touchdown.~~

(e) ~~Approach operations utilising EVS – CAT I operations~~

(1) ~~At DH or MDH, the following visual references should be displayed and identifiable to the pilot on the EVS:~~

(i) ~~elements of the approach light; or~~

(ii) ~~the runway threshold, identified by at least one of the following:~~

(A) ~~the beginning of the runway landing surface,~~

(B) ~~the threshold lights, the threshold identification lights; or~~

(C) ~~the touchdown zone, identified by at least one of the following: the runway touchdown zone landing surface, the touchdown zone lights, the touchdown zone markings or the runway lights.~~

(2) ~~At 100 ft above runway threshold elevation at least one of the visual references specified below should be distinctly visible and identifiable to the pilot without reliance on the EVS:~~

(i) ~~the lights or markings of the threshold; or~~

(ii) the lights or markings of the touchdown zone.

(f) Approach operations utilising EVS – APV and NPA operations flown with the CDFA technique

(1) At DH/MDH, visual references should be displayed and identifiable to the pilot on the EVS image as specified under (a).

(2) At 200 ft above runway threshold elevation, at least one of the visual references specified under (a) should be distinctly visible and identifiable to the pilot without reliance on the EVS.

(a) The touchdown RVR should be the controlling RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

(c) Where the RVR is not available, CMV should be used, except for the purpose of continuation of an approach in LVO in accordance with AMC8 NCC.OP.110.

The following GM1 NCC.OP.230 is inserted:

GM1 NCC.OP.230 Commencement and continuation of approach

APPLICATION OF RVR OR VIS REPORTS — AEROPLANES

(a) There is no prohibition on the commencement of an approach based on the reported RVR or VIS. The restriction in NCC.OP.230 applies only if the RVR or VIS is reported and applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or in the FAS, as applicable.

APPLICATION OF RVR OR VIS REPORTS — HELICOPTERS

(b) There is no prohibition on the commencement of an approach based on the reported RVR. The restriction in NCC.OP.230 applies to the continuation of the approach past a point where the aircraft is 1 000ft above the aerodrome elevation or in the FAS, as applicable.

The prohibition to continue the approach applies only if the RVR is reported and is below 550m and is below the operating minima. There is no prohibition based on VIS.

(c) If the reported RVR is 550m or greater, but it is less than the RVR calculated in accordance with AMC5 CAT.OP.MPA.110, a go-around is likely to be necessary since visual reference may not be established at the DH or MDH. Similarly, in the absence of an RVR report, the reported visibility or a digital image may indicate that a go-around is likely. The pilot-in-command should consider available options, based on a thorough assessment of risk, such as diverting to an alternate aerodrome, before commencing the approach.

APPLICATION OF RVR OR VIS REPORTS — ALL AIRCRAFT

(d) If a deterioration in the RVR or VIS is reported once the aircraft is below 1 000ft or in the FAS, as applicable, then there is no requirement for the approach to be discontinued. In this situation, the normal visual reference requirements would apply at the DA/H.

(e) Where additional RVR information is provided (e.g. midpoint and stop end), this is advisory; such information may be useful to the pilot in order to determine whether there will be sufficient visual reference to control the aircraft during roll-out and taxi. For operations where the aircraft will be controlled manually during roll-out, Table 1 in AMC1 SPA.LVO.100(a) provides an indication of the RVR that may be required to allow manual lateral control of the aircraft on the runway.

The following AMC1 NCC.OP.230(b) is inserted:

AMC1 NCC.OP.230(b) Commencement and continuation of approach

MINIMUM RVR FOR CONTINUATION OF APPROACH — HELICOPTERS

(a) The touchdown RVR should be the controlling RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

The following AMC1 NCC.OP.230(c) is inserted:

AMC1 NCC.OP.230(c) Commencement and continuation of approach

VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS

For instrument approach operations Type A and CAT I instrument approach operations Type B, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot at the MDA/H or the DA/H:

(a) elements of the approach lighting system;

(b) the threshold;

(c) the threshold markings;

(d) the threshold lights;

(e) the threshold identification lights;

(f) the visual glide path indicator;

(g) the TDZ or TDZ markings;

(h) the TDZ lights;

(i) the FATO/runway edge lights;

(j) for helicopter PinS approaches, the identification beacon light and visual ground reference;

(k) for helicopter PinS approaches, the identifiable elements of the environment defined on the instrument chart;

(l) for helicopter PinS approaches with instructions to 'proceed VFR', sufficient visual cues to determine that VFR criteria are met; or

(m) other visual references specified in the operations manual.

The following GM1 NCC.OP.230(f) is inserted:

GM1 NCC.OP.230(f) Commencement and continuation of approach

APPROACHES WITH NO INTENTION TO LAND

The approach may be continued to the DA/H or the MDA/H regardless of the reported RVR or VIS. Such operations should be coordinated with air traffic services (ATS).

The following GM1 NCC.OP.235 is inserted:

GM1 NCC.OP.235 EFVS 200 operations

GENERAL

(a) EFVS operations exploit the improved visibility provided by the EFVS to extend the visual segment of an instrument approach. EFVSs cannot be used to extend the instrument segment of an approach and thus the DH for EFVS 200 operations is always the same as for the same approach conducted without EFVS.

(b) Equipment for EFVS 200 operations

(1) In order to conduct EFVS 200 operations, a certified EFVS is used (EFVS-A or EFVS-L). An EFVS is an enhanced vision system (EVS) that also incorporates a flight guidance system and displays the image on a HUD or equivalent display. The flight guidance system will incorporate aircraft flight information and flight symbology.

(2) In multi-pilot operations, a suitable display of EFVS sensory imagery is provided to the pilot monitoring.

(c) Suitable approach procedures

(1) Types of approach operation are specified in AMC1 NCC.OP.235(a)(2).

EFVS 200 operations are used for 3D approach operations. This may include operations based on NPA procedures, approach procedures with vertical guidance and PA procedures including approach operations requiring specific approvals, provided that the operator holds the necessary approvals.

(2) Offset approaches

Refer to AMC1 NCC.OP.235(a)(2).

(3) Circling approaches

EFVSs incorporate a HUD or an equivalent system so that the EFVS image of the scene ahead of the aircraft is visible in the pilot's forward external FOV. Circling operations require the pilot to maintain visual references that may not be directly ahead of the aircraft and may not be aligned with the current flight path. EFVSs cannot therefore be used in place of natural visual reference for circling approaches.

(d) The aerodrome operating minima for EFVS 200 operations are determined in accordance with AMC1 NCC.OP.235(a)(8).

The performance of EFVSs depends on the technology used and weather conditions encountered. Table 1 'Operations utilising EFVS: RVR reduction' has been developed after an operational evaluation of two different EVSs, both using infrared sensors, along with data and support provided by the FAA. Approaches were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. Table 1 contains conservative figures to cater for the expected performance of infrared sensors in the variety of conditions that might be encountered. Some systems may have better capability than those used for the evaluation, but credit cannot be taken for such performance in EFVS 200 operations.

(e) The conditions for commencement and continuation of the approach are in accordance with NCC.OP.230.

Pilots conducting EFVS 200 operations may commence an approach and continue that approach below 1 000 ft above the aerodrome or into the FAS if the reported RVR or CMV is equal to or greater than the lowest RVR minima determined in accordance with AMC1 NCC.OP.235(a)(8) and if all the conditions for the conduct of EFVS 200 operations are met.

Should any equipment required for EFVS 200 operations be unserviceable or unavailable, the conditions to conduct EFVS 200 operations would not be satisfied, and the approach should not be commenced. In the event of failure of the equipment required for EFVS 200 operations after the aircraft descends below 1 000 ft above the aerodrome or into the FAS, the conditions of NCC.OP.230 would no longer be satisfied unless the RVR reported prior to commencement of the approach was sufficient for the approach to be flown without the use of EFVS in lieu of natural vision.

(f) The EFVS image requirements at the DA/H are specified in AMC1 NCC.OP.235(a)(4).

The requirements for features to be identifiable on the EFVS image in order to continue approach below the DH are more stringent than the visual reference requirements for the same approach flown without EFVS. The more stringent standard is needed because the EFVS might not display the colour of lights used to identify specific portions of the runway and might not consistently display the runway markings. Any visual approach path indicator using colour-coded lights may be unusable.

(g) Obstacle clearance in the visual segment

The 'visual segment' is the portion of the approach between the DH or the MAPt and the runway threshold. In the case of EFVS 200 operations, this part of the approach may be flown using the EFVS image as the primary reference and obstacles may not always be identifiable on an EFVS image. The operational assessment specified in AMC1 NCC.OP.235(a)(2) is therefore required to ensure obstacle clearance during the visual segment.

(h) Visual reference requirements at 200 ft above the threshold

For EFVS 200 operations, natural visual reference is required by a height of 200 ft above the runway threshold. The objective of this requirement is to ensure that the pilot will have sufficient visual reference to land. The visual reference should be the same as the one required for the same approach flown without the use of EFVS.

Some EFVSs may have additional requirements that have to be fulfilled at this height to allow the approach to continue, such as a requirement to check that elements of the EFVS display remain correctly aligned and scaled to the external view. Any such requirements will be detailed in the AFM and included in the operator's procedures.

(i) Specific approval for EFVS

In order to use an EFVS without natural visual reference below 200 ft above the threshold, the operator needs to hold a specific approval in accordance with Part-SPA.

(j) Go-around

A go-around will be promptly executed if the required visual references are not maintained on the EFVS image at any time after the aircraft has descended below the DA/H or if the required visual references are not distinctly visible and identifiable using natural vision after the aircraft is below 200 ft. It is considered more likely that an EFVS 200 operation could result in the initiation of a go-around below the DA/H than the equivalent approach flown without EFVS, and thus the operational assessment required by AMC1 NCC.OP.235(a)(2) takes into account the possibility of a balked landing.

An obstacle free zone (OFZ) may also be provided for CAT I precision approach (PA) procedures. Where an OFZ is not provided for a CAT I precision approach, this may be indicated on the approach chart. NPA procedures and approach procedures with vertical guidance provide obstacle clearance for the missed approach based on the assumption that a go-around is executed at the MAPt and not below the MDH.

The following AMC1 NCC.OP.235(a) is inserted:

AMC1 NCC.OP.235(a)(1) EFVS 200 operations

EQUIPMENT CERTIFICATION

For EFVS 200 operations, the aircraft should be equipped with an approach system using EFVS-A or a landing system using EFVS-L.

The following AMC1 NCC.OP.235(a)(2) is inserted:

AMC1 NCC.OP.235(a)(2) EFVS 200 operations

AERODROMES AND INSTRUMENT PROCEDURES SUITABLE FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the operator should verify the suitability of a runway before authorising EFVS operations to that runway through an operational assessment taking into account the following elements:

(1) the obstacle situation;

(2) the type of aerodrome lighting;

(3) the available IAPs;

(4) the aerodrome operating minima; and

(5) any non-standard conditions that may affect the operations.

(b) EFVS 200 operations should only be conducted as 3D operations, using an IAP in which the final approach track is offset by a maximum of 3 degrees from the extended centre line of the runway.

(c) The IAP should be designed in accordance with PANS-OPS, Volume I (ICAO Doc 8168) or equivalent criteria.

The following AMC2 NCC.OP.235(a)(2) is inserted:

AMC2 NCC.OP.235(a)(2) EFVS 200 operations

VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS 200 OPERATIONS

The operational assessment before authorising the use of a runway for EFVS 200 operations may be conducted as follows:

(a) Check whether the runway has been promulgated as suitable for EFVS 200 operations or is certified as a PA category II or III runway by the State of the aerodrome. If this is so, then check whether and where the approach and runway lights installed (notably incandescent or LED lights) are adequate for the EFVS equipment used by the operator.

(b) If the check in point (a) above comes out negative (the runway is not promulgated as EFVS suitable or is not category II or III), then proceed as follows:

(1) For straight-in IAPs, US Standard for Terminal Instrument Procedures (TERPS) may be considered to be acceptable as an equivalent to PANS-OPS. If other design criteria than PANS-OPS or US TERPS are used, the operations should not be conducted.

(2) If an OFZ is established, this will ensure adequate obstacle protection from 960m before the threshold. If an OFZ is not established or if the DH for the approach is above 250 ft, then check whether there is a visual segment surface (VSS).

(3) VSSs are required for procedures published after 15 March 2007, but the existence of the VSS has to be verified through an aeronautical information publication (AIP), operations manual Part C, or direct contact with the aerodrome. Where the VSS is established, it may not be penetrated by obstacles. If the VSS is not established or is penetrated by obstacles and an OFZ is not established, then the operations should not be conducted. Note: obstacles of a height of less than 50ft above the threshold may be disregarded when assessing the VSS.

(4) Runways with obstacles that require visual identification and avoidance should not be accepted.

(5) For the obstacle protection of a balked landing where an OFZ is not established, the operator may develop an alternative lateral profile to be followed in the event of a go-around below the DA/H;

(6) Perform an assessment of the suitability of the runway which should include whether the approach and runway lights installed (notably incandescent or LED lights) are adequate for the EFVS equipment used by the operator.

(c) If the AFM stipulates specific requirements for approach procedures, then the operational assessment should verify that these requirements can be met.

The following AMC1 NCC.OP.235(a)(3) is inserted:

AMC1 NCC.OP.235(a)(3) EFVS 200 operations

INITIAL TRAINING FOR EFVS 200 OPERATIONS

Operators should ensure that flight crew members complete the following conversion training before being authorised to conduct EFVS operations unless credits related to training and checking for previous experience on similar aircraft types are defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012:

(a) A course of ground training including at least the following:

(1) characteristics and limitations of head-up displays (HUDs) or equivalent display systems including information presentation and symbology;

(2) EFVS sensor performance in different weather conditions, sensor limitations, scene interpretation, visual anomalies and other visual effects;

(3) EFVS display, control, modes, features, symbology, annunciations and associated systems and components;

(4) the interpretation of EFVS imagery;

(5) the interpretation of approach and runway lighting systems and display characteristics when using EFVS;

(6) pre-flight planning and selection of suitable aerodromes and approach procedures;

(7) principles of obstacle clearance requirements;

(8) the use and limitations of RVR assessment systems;

(9) normal, abnormal and emergency procedures for EFVS 200 operations;

(10) the effect of specific aircraft/system malfunctions;

(11) human factors aspects of EFVS 200 operations; and

(12) qualification requirements for pilots to obtain and retain approval for EFVS 200 operations.

(b) A course of FSTD training and/or flight training in two phases as follows:

(1) Phase one (EFVS 200 operations with aircraft and all equipment serviceable) — objectives:

(i) understand the operation of equipment required for EFVS 200 operations;

(ii) understand operating limitations of the installed EFVS;

(iii) practice the use of HUD or equivalent display systems;

(iv) practice the set-up and adjustment of EFVS equipment in different conditions (e.g. day and night);

(v) practice the monitoring of automatic flight control systems, EFVS information and status annunciators;

(vi) practice the interpretation of EFVS imagery;

(vii) become familiar with the features needed on the EFVS image to continue approach below the DH;

(viii) practice the identification of visual references using natural vision while using EFVS equipment;

(ix) master the manual aircraft handling relevant to EFVS 200 operations including, where appropriate, the use of the flare cue and guidance for landing;

(x) practice coordination with other crew members; and

(xi) become proficient at procedures for EFVS 200 operations.

(2) Phase one of the training should include the following exercises:

(i) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

(ii) the use of HUD or equivalent display systems during all phases of flight;

(iii) approach using the EFVSs installed on the aircraft to the appropriate DH and transition to visual flight and landing;

(iv) approach with all engines operating using the EFVS, down to the appropriate DH followed by a missed approach, all without external visual reference, as appropriate.

(3) Phase two (EFVS 200 operations with aircraft and equipment failures and degradations) — objectives:

(i) understand the effect of known aircraft unserviceabilities including use of the MEL;

(ii) understand the effect of failed or downgraded equipment on aerodrome operating minima;

(iii) understand the actions required in response to failures and changes in the status of the EFVS including HUD or equivalent display systems;

(iv) understand the actions required in response to failures above and below the DH;

(v) practice abnormal operations and incapacitation procedures; and

(vi) become proficient at dealing with failures and abnormal situations during EFVS 200 operations.

(4) Phase two of the training should include the following exercises:

(i) approaches with engine failures at various stages of the approach;

(ii) approaches with failures of the EFVS at various stages of the approach, including failures between the DH and the height below which an approach should not be continued if natural visual reference is not acquired, require either:

(A) reversion to head down displays to control missed approach; or

(B) reversion to flight with downgraded or no guidance to control missed approaches from the DH or below, including those which may result in a touchdown on the runway;

(iii) incapacitation procedures appropriate to EFVS 200 operations;

(iv) failures and procedures applicable to the specific EFVS installation and aircraft type; and

(v) FSTD training, which should include minimum eight approaches.

The following AMC2 NCC.OP.235(a)(3) is inserted:

AMC2 NCC.OP.235(a)(3) EFVS 200 operations

RECURRENT TRAINING AND CHECKING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the pilots are competent to perform EFVS 200 operations. To do so, pilots should be trained every 6 months by performing at least two approaches on each type of aircraft operated.

(b) The operator should ensure that the pilots' competence to perform EFVS 200 operations is checked at each required demonstration of competence by performing at least two approaches on each type of aircraft operated, of which one should be flown without natural vision to 200ft.

The following AMC3 NCC.OP.235(a)(3) is inserted:

AMC3 NCC.OP.235(a)(3) EFVS 200 operations

RECENT EXPERIENCE REQUIREMENTS FOR EFVS 200 OPERATIONS

Pilots should complete a minimum of four approaches using the operator's procedures for EFVS 200 operations during the validity period of the periodic demonstration of competence unless credits related to currency are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

The following AMC4 NCC.OP.235(a)(3) is inserted:

AMC4 NCC.OP.235(a)(3) EFVS 200 operations

DIFFERENCES TRAINING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the flight crew members authorised to conduct EFVS 200 operations are provided with differences training or familiarisation whenever there is a change to any of the following:

(1) the technology used in the flight guidance and flight control system;

(2) the HUD or equivalent display systems;

(3) the operating procedures.

(b) The differences training should:

(1) meet the objectives of the appropriate initial training course;

(2) take into account the flight crew members' previous experience; and

(3) take into account the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

The following AMC5 NCC.OP.235(a)(3) is inserted:

AMC5 NCC.OP.235(a)(3) EFVS 200 operations

TRAINING FOR EFVS 200 OPERATIONS

If a flight crew member is to be authorised to operate as pilot flying and pilot monitoring during EFVS 200 operations, then the flight crew member should complete the required FSTD training for each operating capacity.

The following GM1 NCC.OP.235(a)(3) is inserted:

GM1 NCC.OP.235(a)(3) EFVS 200 operations

RECURRENT CHECKING FOR EFVS 200 OPERATIONS

In order to provide the opportunity to practice decision-making in the event of system failures and failure to acquire natural visual reference, the recurrent training and checking for EFVS 200 operations is recommended to periodically include different combinations of equipment failures, go-around due to loss of visual reference, and landings.

The following AMC1 NCC.OP.235(a)(4) is inserted:

AMC1 NCC.OP.235(a)(4) EFVS 200 operations

OPERATING PROCEDURES FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the following should apply:

- (1) the pilot flying should use the EFVS throughout the approach;
- (2) in multi-pilot operations, a suitable display of EFVS sensory imagery should be provided to the pilot monitoring;
- (3) the approach between the FAF and the DA/H should be flown using vertical flight path guidance;
- (4) the approach may be continued below the DA/H provided that the pilot can identify on the EFVS image either:
  - (i) the approach light system; or
  - (ii) both of the following:
    - (A) the runway threshold identified by the beginning of the runway landing surface, the threshold lights or the runway end identifier lights; and
    - (B) the TDZ identified by the TDZ lights, the TDZ runway markings or the runway lights;
- (5) a missed approach should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by 200ft above the threshold.

(b) Operating procedures for EFVS 200 operations should:

- (1) be consistent with the AFM;
- (2) be appropriate to the technology and equipment to be used;

(3) specify the duties and responsibilities of each flight crew member in each relevant phase of flight;

(4) ensure that flight crew workload is managed to facilitate effective decision-making and monitoring of the aircraft; and

(5) deviate to the minimum extent practicable from normal procedures used for routine operations.

(c) Operating procedures should include:

(1) the required checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;

(2) the correct seating and eye position;

(3) determination of aerodrome operating minima;

(4) the required visual references at the DH;

(5) the action to be taken if natural visual reference is not acquired by 200 ft;

(6) the action to be taken in the event of loss of the required visual reference; and

(7) procedures for balked landing.

(d) Operating procedures for EFVS 200 operations should be included in the operations manual.

The following AMC1 NCC.OP.235(a)(8) is inserted:

AMC1 NCC.OP.235(a)(8) EFVS 200 operations

AERODROME OPERATING MINIMA — EFVS 200 OPERATIONS

When conducting EFVS 200 operations:

(a) the DA/H used should be the same as for operations without EFVS;

(b) the lowest RVR minima to be used should be determined by reducing the RVR presented in:

(1) Table 8 in AMC5 NCC.OP.110 in accordance with Table 1 below for aeroplanes;

(2) Table 12 of AMC6 NCC.OP.110 in accordance with Table 1 below for helicopters;

(c) in case of failed or downgraded equipment, Table 15 in AMC9 NCC.OP.110 should apply.

Table 1

Operations utilising EFVS: RVR reduction

RVR (m) presented in Table 8 in AMC5 NCC.OP.110 or in Table 12 of AMC6 NCC.OP.110	RVR (m) for EFVS 200 operations
550	550
600	550
650	550
700	550
750	550

RVR (m) presented in Table 8 in AMC5 NCC.OP.110 or in Table 12 of AMC6 NCC.OP.110	RVR (m) for EFVS 200 operations
800	550
900	600
1 000	650
1 100	750
1 200	800
1 300	900
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2 400	1 600

The following AMC1 NCC.OP.235(c) is inserted:

AMC1 NCC.OP.235(c) EFVS 200 operations

EVFS 200 WITH LEGACY SYSTEMS UNDER AN APPROVAL

The EVS should be certified before 1 January 2022 as 'EVS with an operational credit'.

The following GM1 NCC.OP.235(c) is inserted:

GM1 NCC.OP.235(c) EFVS 200 operations

The CAA referred to in NCC.OP.235 point (c) is the competent authority for the oversight of the operator, as established in ORO.GEN.105.

The following AMC1 NCC.IDE.H.120(c) is inserted:

AMC1 NCC.IDE.H.120(c) Operations under VFR — flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots should be considered to be required by the operation if multi-pilot operations are required by one of the following:

(a) the AFM;

(b) at night;

(c) the operations manual.

The following GM1 NCC.IDE.H.120(c) is inserted:

GM1 NCC.IDE.H.120(c) Operations under VFR — flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS ON A VOLUNTARY BASIS — HELICOPTERS OPERATED BY DAY UNDER VFR

If the AFM permits single-pilot operations, and the operator decides that the crew composition is more than one pilot for day VFR operations only, then point NCC.IDE.H.120(c) does not apply. However, additional displays, including those referred to in NCC.IDE.H.120(c), may be required under point NCC.IDE.H.100(e).

The following AMC1 NCC.IDE.H.125(c) is inserted:

AMC1 NCC.IDE.H.125(c) Operations under IFR – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots should be considered to be required by the operation if multi-pilot operations are required by one of the following:

(a) the AFM;

(b) the operations manual.

Annex VII – Part- NCO

Annex VII is amended as follows:

The following AMC1 NCO.OP.101(a) is inserted:

AMC1 NCO.OP.101(a) Altimeter check and settings

PRE-FLIGHT ALTIMETER CHECK

A serviceable altimeter indicates the elevation of the point selected, plus the height of the altimeter above this point, within a tolerance of ± 60 ft.

If the altimeter does not indicate the reference elevation or height exactly but is within the specified tolerances, no adjustment of this indication should be made at any stage of a flight. Also, any error which is within tolerance on the ground should be ignored by the pilot during flight.

If no altimeter setting is available at the aerodrome or operating site of departure, the altimeter should be set using the elevation of the aerodrome or operating site, and the altimeter setting should be verified on first contact with an ATS unit.

AMC1 NCO.GEN.105(c) is replaced by the following:

AMC1 NCO.GEN.105(~~c~~)(a)(3) Pilot-in-command responsibilities and authority

CHECKLISTS

(a) The pilot-in-command should use the latest checklists provided by the manufacturer.

(b) If checks conducted prior to take-off are suspended at any point, the pilot-in-command should ~~re-start~~ restart them from a safe point prior to the interruption.

AMC1 NCO.OP.110 is replaced by the following:

AMC1 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

TAKE-OFF OPERATIONS

(a) General~~:~~

~~(1)~~ Take-off minima should be expressed as visibility (VIS) or runway visual range (RVR) limits, taking into account all relevant factors for each ~~aerodrome~~runway/final approach and take-off area (FATO)/operating site planned to be used and aircraft characteristics and equipment. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions, e.g. ceiling, it should be specified.

~~(2) When the reported meteorological visibility is below that required for take-off and RVR is not reported, a take-off should only be commenced if the pilot-in-command can determine that the visibility along the take-off runway/area is equal to or better than the required minimum.~~

~~(3) When no reported meteorological visibility or RVR is available, a take-off should only be commenced if the pilot-in-command can determine that the RVR/VIS along the take-off runway/area is equal to or better than the required minimum.~~

(b) Visual reference~~:~~

(1) The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and ~~a continued take-off after failure of the critical engine~~an engine failure after rotation.

(2) For night operations, ~~ground lights should be available to illuminate the runway/final approach and take-off area (FATO) and any obstacles~~ sufficient lighting should be in operation to illuminate the runway/final approach and take-off area (FATO) and any relevant obstacles.

(3) For point-in-space (PinS) departures to an initial departure fix (IDF), the take-off minima should be selected to ensure sufficient guidance to see and avoid obstacles and return to the heliport if the flight cannot be continued visually to the IDF. The minimum VIS should be 800 m and the minimum ceiling should be 250 ft.

(4) For helicopters outside of a runway environment, the minimum VIS should be 800 m, and for offshore helideck operations, the minimum VIS should be 500 m.

The following AMC2 NCO.OP.110 is inserted:

AMC2 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

RVR OR VIS FOR INSTRUMENT APPROACH OPERATIONS — DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The RVR (or for non-instrument runways, VIS) for straight-in instrument approach operations should not be less than the greatest of the following:

(1) the minimum RVR (or for non-instrument runways, VIS) for the type of runway used according to Table 1;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 2;

(3) the minimum RVR according to the visual and non-visual aids and on-board equipment used according to Table 3.

(b) For Category A and B aeroplanes, if the RVR determined in accordance with (a) is greater than 1500 m, then 1500 m should be used.

(c) The visual aids, if available, may comprise standard runway day markings, runway edge lights, threshold lights, runway end lights and approach lights as defined in Table 6.

(d) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable except as provided for in GM5 NCO.OP.110.

Table 1

Type of runway versus minimum RVR or VIS — aeroplanes

Type of runway	Minimum RVR or VIS (m)
Precision approach (PA) runway, category I	550
Non-precision approach (NPA) runway	750
Non-instrument runway	Visibility according to Table 1 in **NCO.OP.112** (Circling minima)

Table 2

RVR versus DH/MDH

DH or MDH			Class of lighting facility			
			FALS	IALS	BALS	NALS
ft			RVR (m)			
200	-	210	550	750	1 000	1 200
211	-	240	550	800	1 000	1 200
241	-	250	550	800	1 000	1 300
251	-	260	600	800	1 100	1 300
261	-	280	600	900	1 100	1 300
281	-	300	650	900	1 200	1 400
301	-	320	700	1 000	1 200	1 400
321	-	340	800	1 100	1 300	1 500
341	-	360	900	1 200	1 400	1 600
361	-	380	1 000	1 300	1 500	1 700
381	-	400	1 100	1 400	1 600	1 800
401	-	420	1 200	1 500	1 700	1 900
421	-	440	1 300	1 600	1 800	2 000
441	-	460	1 400	1 700	1 900	2 100
461	-	480	1 500	1 800	2 000	2 200
481	-	500	1 500	1 800	2 100	2 300
501	-	520	1 600	1 900	2 100	2 400
521	-	540	1 700	2 000	2 200	2 400
541	-	560	1 800	2 100	2 300	2 400
561	-	580	1 900	2 200	2 400	2 400
581	-	600	2 000	2 300	2 400	2 400
601	-	620	2 100	2 400	2 400	2 400
621	-	640	2 200	2 400	2 400	2 400
641	-	660	2 300	2 400	2 400	2 400
661	and above		2 400	2 400	2 400	2 400

Table 3

Visual and non-visual aids and/or on-board equipment versus minimum RVR — aeroplanes

Type of approach	Facilities	Lowest RVR (m)
PA and APV procedure	RTZL and RCLL	[no limitation]
	without RTZL and RCLL but using HUDLS or equivalent system; coupled autopilot or flight director to DH	[no limitation]
	No RTZL and RCLL, not using HUDLS or equivalent system or autopilot to DH.	750
NPA procedure	Final approach track offset <15 ° for category A and B aeroplanes or <5 ° Category C and D aeroplanes	750
	Final approach track offset ≥ 15° for category A or B aeroplanes	1 000
	Final approach track offset ≥ 5° for category C or D aeroplanes	1 200

DETERMINATION OF RVR FOR INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

(e) For IFR operations, the RVR should not be less than the greatest of the following:

(1) the minimum RVR for the type of runway/FATO used according to Table 4; or

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 5;

(3) for PinS operations with instructions to 'proceed visually', the distance between the MAPt of the PinS and the FATO/approach light system.

(f) For PinS operations with instructions to 'proceed VFR', the VIS should be compatible with visual flight rules.

(g) The visual aids, if available, may comprise standard runway day markings, runway edge lights, threshold lights, runway, end lights and approach lights as defined in Table 6.

(h) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable.

Table4

Type of runway/FATO versus minimum RVR — helicopters

Type of runway/FATO	Minimum RVR or VIS (m)
PA runway, category I NPA runway Non-instrument runway	RVR 550
Instrument FATO FATO	RVR 550 RVR or VIS 800

Table 5

DH/MDH versus minimum RVR — helicopters

DH/MDH (ft)	Facilities versus RVR (m)*			
	FALS	**IALS**	**BALS**	**NALS**
200	550	600	700	1 000
201–249	550	650	750	1 000
250–299	600*	700*	800	1 000
300 and above	750*	800	900	1 000

* Minima on 2D approach operations should be no lower than 800 m.

APPROACH LIGHTING SYSTEMS — AEROPLANES AND HELICOPTERS

Table 6

Approach lighting systems

Class of lighting facility	Length, configuration and intensity of approach lights
FALS	CAT I lighting system (HIALS ≥720 m) distance coded centre line, barrette centre line
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS <210 m) or no approach lights

AMC2 NCO.OP.110 is replaced by the following:

AMC32 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

VISUAL APPROACH

For a visual approach operation, the RVR should not be less than 800 m.

AMC3 NCO.OP.110 is deleted:

~~AMC3 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters~~

~~**EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT**~~

~~(a) Non-precision approaches requiring a final approach fix (FAF) and/or missed approach point (MAPt) should not be conducted where a method of identifying the appropriate fix is not available.~~

~~(b) A minimum RVR of 750 m should be used for CAT I approaches in the absence of centreline lines and/or touchdown zone lights.~~

~~(c) Where approach lighting is partly unavailable, minima should take account of the serviceable length of approach lighting.~~

GM 1 NCO.OP.110 is replaced by the following:

GM1 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

~~**COMMERCIALLY AVAILABLE INFORMATION**~~

~~An acceptable method of selecting aerodrome operating minima is through the use of commercially available information.~~

AIRCRAFT CATEGORIES

(a) Aircraft categories should be based on the indicated airspeed at threshold (V_{AT}), which is equal to the stalling speed (V_{SO}) multiplied by 1.3 or where published 1-g (gravity) stall speed (V_{S1g}) multiplied by 1.23 in the landing configuration at the maximum certified landing mass. If both V_{SO} and V_{S1g} are available, the higher resulting V_{AT} should be used.

(b) The aircraft categories specified in Table 7 should be used.

Table 7: Aircraft categories corresponding to VAT values

Aircraft category	V_{AT}
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

(c) Helicopters are also eligible for Category H where applicable.

GM2 NCO.OP.110 is replaced by the following:

GM2 NCO.OP. 110 Aerodrome operating minima – aeroplanes and helicopters

~~VERTICAL PATH CONTROL~~

~~Due consideration should be given to the selection of an appropriate technique for vertical path control on non-precision approaches (NPAs). Where appropriate instrumentation and/or facilities are available, a continuous descent final approach technique (CDFA) usually offers increased safety and a lower workload compared to a step-down approach.~~

FLIGHTS WITH VFR AND IFR SEGMENTS

Where a flight contains VFR and IFR segments, aerodrome operating minima need be established only as far as relevant to the IFR segments. Attention is drawn to NCO.OP.160 (a) and (c), according to which, the pilot-in-command shall be satisfied that the VFR segments will be conducted in conditions at or above the applicable VFR operating minima. For example, for a VFR departure changing to IFR at a transition point en-route and an IFR arrival at destination, the pilot-in-command should be satisfied that VMC will exist up to the transition point, and aerodrome operating minima should be established for the destination and any alternate destinations required.

GM3 NCO.OP.110 is replaced by the following:

GM3 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

~~CRITERIA FOR ESTABLISHING RVR/CMV~~

~~(a) In order to qualify for the lowest allowable values of RVR/CMV specified in Table 3.A, the instrument approach should meet at least the following facility requirements and associated conditions:~~

~~(1) Instrument approaches with designated vertical profile up to and including 4.5° for Category A and B aeroplanes, or 3.77° for Category C and D aeroplanes, where the facilities are:~~

~~(i) instrument landing system (ILS)/microwave landing system (MLS)/GBAS landing system (GLS)/precision approach radar (PAR); or~~

~~(ii) approach procedure with vertical guidance (APV); and~~

~~where the final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes.~~

~~(2) Instrument approach operations flown using the CDFA technique with a nominal vertical profile, up to and including 4.5° for Category A and B aeroplanes, or 3.77° for Category C and D aeroplanes, where the facilities are non-directional beacon (NDB), NDB/distance measuring equipment (DME), VHF omnidirectional radio range (VOR), VOR/DME, localiser (LOC), LOC/DME, VHF direction finder (VDF), surveillance radar approach (SRA) or global navigation satellite system (GNSS)/lateral navigation (LNAV), with a final approach segment of at least 3 NM, which also fulfil the following criteria:~~

~~(i) the final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes;~~

~~(ii) the final approach fix (FAF) or another appropriate fix where descent is initiated is available, or distance to threshold (THR) is available by flight management system (FMS)/area navigation (NDB/DME) or DME; and~~

~~(iii) the missed approach point (MAPt) is determined by timing, the distance from FAF to THR is ≤ 8 NM.~~

~~(3) Instrument approaches where the facilities are NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA or GNSS/LNAV, not fulfilling the criteria in (a)(2), or with an minimum descent height (MDH) ≥ 1 200 ft.~~

~~(b) The missed approach operation, after an approach operation has been flown using the CDFA technique, should be executed when reaching the decision height/altitude (DH/A) or the MAPt, whichever occurs first. The lateral part of the missed approach procedure should be flown via the MAPt unless otherwise stated on the approach chart.~~

MEANS TO DETERMINE THE REQUIRED RVR BASED ON DH AND LIGHTING FACILITIES

(a) The values in Table 2 are derived from the formula below:

RVR (m) = [(DH/MDH (ft) x 0.3048)/tanα] — length of approach lights (m),

where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 2 up to 3.77° and then remaining constant. An upper RVR limit of 2 400m has been applied to the table.

(b) The lighting system classes in Table 2 have the meaning specified in Table 6.

GM4 NCO.OP.110 is replaced by the following:

GM4 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

~~**DETERMINATION OF RVR/CMV/VIS MINIMA FOR NPA, APV, CAT I — AEROPLANES**~~

~~(a) The minimum RVR/CMV/VIS should be the highest of the values specified in Table 2 and Table 3.A but not greater than the maximum values specified in Table 3.A, where applicable.~~

~~(b) The values in Table 2 should be derived from the formula below:~~

~~required RVR/VIS (m) = [(DH/MDH (ft) x 0.3048) / tanα] – length of approach lights (m);~~

~~where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 2 up to 3.77° and then remaining constant.~~

~~(c) If the approach is flown with a level flight segment at or above MDA/H, 200 m should be added for Category A and B aeroplanes and 400 m for Category C and D aeroplanes to the minimum RVR/CMV/VIS value resulting from the application of Table 2 and Table 3.A.~~

~~(d) An RVR of less than 750 m, as indicated in Table 2, may be used:~~

~~(1) for CAT I operations to runways with full approach lighting system (FALS), runway touchdown zone lights (RTZL) and runway centreline lights (RCLL);~~

~~(2) for CAT I operations to runways without RTZL and RCLL when using an approved head-up guidance landing system (HUDLS), or equivalent approved system, or when conducting a coupled approach or flight-director-flown approach to a DH. The instrument landing system (ILS) should not be published as a restricted facility; and~~

(3) for approach procedure with vertical guidance (APV) operations to runways with FALS, RTZL and RCLL when using an approved head-up display (HUD).

(e) Lower values than those specified in Table 2 may be used for HUDLS and auto-land operations if approved in accordance with SPA.LVO.

(f) The visual aids should comprise standard runway day markings and approach and runway lights as specified in Table 1. The CAA may approve that RVR values relevant to a basic approach lighting system (BALS) are used on runways where the approach lights are restricted in length below 210 m due to terrain or water, but where at least one cross-bar is available.

(g) For night operations or for any operation where credit for runway and approach lights is required, the lights should be on and serviceable, except as provided for in Table 1.

(h) For single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:

(1) an RVR of less than 800 m, as indicated in Table 2, may be used for CAT I approaches provided any of the following is used at least down to the applicable DH:

(i) a suitable autopilot, coupled to an ILS, microwave landing system (MLS) or GBAS landing system (GLS) that is not published as restricted; or

(ii) an approved HUDLS, including, where appropriate, enhanced vision system (EVS), or equivalent approved system;

(2) where RTZL and/or RCLL are not available, the minimum RVR/CMV should not be less than 600 m; and

(3) an RVR of less than 800 m, as indicated in Table 2, may be used for APV operations to runways with FALS, RTZL and RCLL when using an approved HUDLS, or equivalent approved system, or when conducting a coupled approach to a DH equal to or greater than 250 ft.

Table 1: Approach lighting systems

Class of lighting facility	Length, configuration and intensity of approach lights
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centreline, Barrette centreline
IALS	Simple approach lighting system (HIALS 420 – 719 m) single source, Barrette
BALS	Any other approach lighting system (HIALS, MIALS or ALS 210 – 419 m)
NALS	Any other approach lighting system (HIALS, MIALS or ALS < 210 m) or no approach lights

Note: HIALS: high intensity approach lighting system;

MIALS: medium intensity approach lighting system;

ALS: approach lighting system.

Table 2: RVR/CMV vs. DH/MDH

DH or MDH			Class of lighting facility			
			FALS	IALS	BALS	NALS
			See (d), (e), (h). above for RVR < 750/800 m			
ft			RVR/CMV (m)			
200	-	210	550	750	1 000	1 200
211	-	220	550	800	1 000	1 200
221	-	230	550	800	1 000	1 200
231	-	240	550	800	1 000	1 200
241	-	250	550	800	1 000	1 300
251	-	260	600	800	1 100	1 300

DH or MDH			Class of lighting facility			
			FALS	IALS	BALS	NALS
			See (d), (e), (h). above for RVR < 750/800 m			
ft			RVR/CMV (m)			
261	-	280	600	900	1 100	1 300
281	-	300	650	900	1 200	1 400
301	-	320	700	1 000	1 200	1 400
321	-	340	800	1 100	1 300	1 500
341	-	360	900	1 200	1 400	1 600
361	-	380	1 000	1 300	1 500	1 700
381	-	400	1 100	1 400	1 600	1 800
401	-	420	1 200	1 500	1 700	1 900
421	-	440	1 300	1 600	1 800	2 000
441	-	460	1 400	1 700	1 900	2 100
461	-	480	1 500	1 800	2 000	2 200
481		500	1 500	1 800	2 100	2 300
501	-	520	1 600	1 900	2 100	2 400
521	-	540	1 700	2 000	2 200	2 400
541	-	560	1 800	2 100	2 300	2 500
561	-	580	1 900	2 200	2 400	2 600
581	-	600	2 000	2 300	2 500	2 700
601	-	620	2 100	2 400	2 600	2 800
621	-	640	2 200	2 500	2 700	2 900
641	-	660	2 300	2 600	2 800	3 000
661	-	680	2 400	2 700	2 900	3 100
681	-	700	2 500	2 800	3 000	3 200
701	-	720	2 600	2 900	3 100	3 300
721	-	740	2 700	3 000	3 200	3 400
741	-	760	2 700	3 000	3 300	3 500
761	-	800	2 900	3 200	3 400	3 600
801	-	850	3 100	3 400	3 600	3 800
851	-	900	3 300	3 600	3 800	4 000
901	-	950	3 600	3 900	4 100	4 300
951	-	1 000	3 800	4 100	4 300	4 500
1 001	-	1 100	4 100	4 400	4 600	4 900
1 101	-	1 200	4 600	4 900	5 000	5 000
1 201 and above			5 000	5 000	5 000	5 000

Table 3.A: CAT I, APV, NPA — aeroplanes

Minimum and maximum applicable RVR/CMV (lower and upper cut-off limits)

Facility/conditions	RVR/CMV (m)	Aeroplane category			
		A	B	C	D
ILS, MLS, GLS, PAR, GNSS/SBAS, GNSS/VNAV	Min	According to Table 2			
	Max	1 500	1 500	2 400	2 400
NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV with a procedure that fulfils the criteria in GM3 NCO.OP.110(a)(2)	Min	750	750	750	750
	Max	1 500	1 500	2 400	2 400
	Min	1 000	1 000	1 200	1 200

Facility/conditions	RVR/CMV (m)	Aeroplane category			
		A	B	C	D
For NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV: not fulfilling the criteria in GM3 NCO.OP.110(a)(2), or with a DH or MDH ≥ 1 200 ft	Max	According to Table 2 if flown using the CDFA technique, otherwise an add-on of 200/400 m applies to the values in Table 2 but not to result in a value exceeding 5 000 m.			

DETERMINATION OF RVR/CMV/VIS MINIMA FOR NPA, CAT I — HELICOPTERS

(a) For non-precision approach (NPA) operations, the minima specified in Table 4.1.H should apply:

(1) where the missed approach point is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required;

(2) for night operations, ground lights should be available to illuminate the FATO/runway and any obstacles; and

(3) for single-pilot operations, the minimum RVR is 800 m or the minima in Table 2, whichever is higher.

(b) For CAT I operations, the minima specified in Table 4.2.H should apply:

(1) for night operations, ground light should be available to illuminate the FATO/runway and any obstacles;

(2) for single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:

(i) an RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, MLS or GLS, in which case normal minima apply; and

(ii) the DH applied should not be less than 1.25 times the minimum use height for the autopilot.

Table 4.1.H: Onshore NPA minima

MDH (ft) *	Facilities vs. RVR/CMV (m) **, ***			
	FALS	IALS	BALS	NALS
250 – 299	600	800	1 000	1 000
300 – 449	800	1 000	1 000	1 000
450 and above	1 000	1 000	1 000	1 000

*: The MDH refers to the initial calculation of MDH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to MDA.

**: The tables are only applicable to conventional approaches with a nominal descent slope of not greater than 4°. Greater descent slopes will usually require that visual glide slope guidance (e.g. precision path approach indicator (PAPI)) is also visible at the MDH.

***: FALS comprise FATO/runway markings, 720 m or more of high intensity/medium intensity (HI/MI) approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.
IALS comprise FATO/runway markings, 420 – 719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.
BALS comprise FATO/runway markings, < 420 m of HI/MI approach lights, any length of low intensity (LI) approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.
NALs comprise FATO/runway markings, FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.

Table 4.2.H: Onshore CAT I minima

DH (ft) *	Facilities vs. RVR/CMV (m) **, ***			
	FALS	IALS	BALS	NALS
200	500	600	700	1 000
201 – 250	550	650	750	1 000
251 – 300	600	700	800	1 000
301 and above	750	800	900	1 000

*: The DH refers to the initial calculation of DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to DA.

**: The table is applicable to conventional approaches with a glide slope up to and including 4°.

***: FALS comprise FATO/runway markings, 720 m or more of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

IALS comprise FATO/runway markings, 420 – 719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

BALS comprise FATO/runway markings, < 420 m of HI/MI approach lights, any length of LI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

NALS comprise FATO/runway markings, FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.

USE OF THIRD-PARTY INFORMATION

If a pilot-in-command uses information provided by a third party for aerodrome operating minima, the pilot-in-command verifies that the method for calculating minima is in accordance with this Regulation.

GM5 NCO.OP.110 is replaced by the following:

GM5 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

CONVERSION OF REPORTED METEOROLOGICAL VISIBILITY TO RVR/CMV

(a) A conversion from meteorological visibility to RVR/CMV should not be used:

(1) when reported RVR is available;

(2) for calculating take-off minima; and

(3) for other RVR minima less than 800 m.

(b) If the RVR is reported as being above the maximum value assessed by the aerodrome operator, e.g. 'RVR more than 1 500 m', it should not be considered as a reported value.

(c) For all other circumstances, Table 5 should be used.

Table 5: Conversion of reported meteorological visibility to RVR/CMV

Lighting elements in operation	RVR/CMV = reported meteorological visibility x	
	Day	Night
High intensity (HI) approach and runway lights	1.5	2.0
Any type of light installation other than above	1.0	1.5
No lights	1.0	not applicable

EFFECT OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT ON LANDING MINIMA

(a) Lighting in Table 5 should be considered only if the relevant lighting is operating. For example, if components of a FALS have failed leaving only the last 250m operating normally, the lighting facilities should be treated as BALS.

(b) Failures of standby equipment, standby power systems, middle markers and RVR assessment systems have no effect on minima.

GM6 NCO.OP.110 is replaced by the following:

~~GM6~~ GM1 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

AIRCRAFT CATEGORIES

(a) Aircraft categories should be based on the indicated airspeed at threshold (V_{AT}), which is equal to the stalling speed (V_{SO}) multiplied by 1.3 or where published 1-g (gravity) stall speed (V_{S1g}) multiplied by 1.23 in the landing configuration at the maximum certified landing mass. If both V_{SO} and V_{S1g} are available, the higher resulting V_{AT} should be used.

(b) The aircraft categories specified in the Table 6 should be used.

Table 7 ~~6~~: Aircraft categories corresponding to VAT values

Aircraft category	V_{AT}
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

(c) Helicopters are also eligible for Category H where applicable.

GM7 NCO.OP.110 is deleted:

GM7 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

~~**CONTINUOUS DESCENT FINAL APPROACH (CDFA) — AEROPLANES**~~

~~(a) Introduction~~

~~(1) Controlled flight into terrain (CFIT) is a major hazard in aviation. Most CFIT accidents occur in the final approach segment of non-precision approaches; the use of stabilised-approach criteria on a continuous descent with a constant, predetermined vertical path is seen as a major improvement in safety during the conduct of such approaches. The following techniques are adopted as widely as possible, for all approaches.~~

(2) The elimination of level flight segments at MDA close to the ground during approaches, and the avoidance of major changes in attitude and power/thrust close to the runway that can destabilise approaches, are seen as ways to reduce operational risks significantly.

(3) The term CDFA has been selected to cover a flight technique for any type of NPA operation.

(4) The advantages of CDFA are as follows:

(i) the technique enhances safe approach operations by the utilisation of standard operating practices;

(ii) the technique is similar to that used when flying an ILS approach, including when executing the missed approach and the associated missed approach procedure manoeuvre;

(iii) the aeroplane attitude may enable better acquisition of visual cues;

(iv) the technique may reduce pilot workload;

(v) the approach profile is fuel efficient;

(vi) the approach profile affords reduced noise levels; and

(vii) the technique affords procedural integration with APV operations.

(b) CDFA

(1) Continuous descent final approach is defined in Annex I to the Regulation on Air operations.

(2) An approach is only suitable for application of a CDFA technique when it is flown along a nominal vertical profile; a nominal vertical profile is not forming part of the approach procedure design, but can be flown as a continuous descent. The nominal vertical profile information may be published or displayed on the approach chart to the pilot by depicting the nominal slope or range/distance vs. height. Approaches with a nominal vertical profile are considered to be:

(i) NDB, NDB/DME (non-directional beacon/distance measuring equipment);

(ii) VOR (VHF omnidirectional radio range), VOR/DME;

(iii) LOC (localiser), LOC/DME;

(iv) VDF (VHF direction finder), SRA (surveillance radar approach); and

(v) GNSS/LNAV (global navigation satellite system/lateral navigation).

(3) Stabilised approach (SAp) is defined in Annex I to the Regulation on Air operations.

(i) The control of the descent path is not the only consideration when using the CDFA technique. Control of the aeroplane's configuration and energy is also vital to the safe conduct of an approach.

(ii) The control of the flight path, described above as one of the requirements for conducting an SAp, should not be confused with the path requirements for using the CDFA technique.

(iii) The predetermined approach slope requirements for applying the CDFA technique are established by the following:

(A) the published 'nominal' slope information when the approach has a nominal vertical profile; and

(B) the designated final-approach segment minimum of 3 NM, and maximum, when using timing techniques, of 8 NM.

(iv) ~~An SAp will never have any level segment of flight at DA/H or MDA/H, as applicable. This enhances safety by mandating a prompt missed approach procedure manoeuvre at DA/H or MDA/H.~~

(v) ~~An approach using the CDFA technique will always be flown as an SAp, since this is a requirement for applying CDFA. However, an SAp does not have to be flown using the CDFA technique, for example a visual approach.~~

GM8 NCO.OP.110 is deleted:

~~GM8 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters~~

~~ONSHORE AERODROME DEPARTURE PROCEDURES — HELICOPTERS~~

~~The cloud base and visibility should be such as to allow the helicopter to be clear of cloud at the take-off decision point (TDP), and for the pilot flying to remain in sight of the surface until reaching the minimum speed for flight in instrument meteorological conditions, as given in the AFM.~~

The following GM1 NCO.OP.110(b)(5) is inserted:

GM1 NCO.OP.110(b)(5) Aerodrome operating minima — aeroplanes and helicopters

VISUAL AND NON-VISUAL AIDS AND INFRASTRUCTURE

'Visual and non-visual aids and infrastructure' refers to all equipment and facilities required for the procedure to be used for the intended instrument approach operation. This includes but is not limited to, lights, markings, ground or space-based radio aids, etc.

AMC1 NCO.OP.111 is replaced by the following:

AMC1 NCO.OP.111 Aerodrome operating minima – ~~NPA, APV, CAT I operations~~ 2D and 3D approach operations

~~NPA FLOWN WITH THE CDFA TECHNIQUE~~

~~When flying a non-precision approach operation using the CDFA technique, the pilot-in-command should ensure that when executing a missed approach, the initiation of the go-around is done at or above the DA/H to avoid flying below the MDA/H.~~

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS AND RUNWAY

When determining the DH/MDH in accordance with the obstacle clearance hight (OCH) for the category of aircraft and the published approach procedure DH or minimum descent height (MDH), the pilot should determine whether the obstacle limitation surface is appropriate for the type of instrument approach flown and runway as this matter may have an impact on the calculation of the OCH and DH/MDH. When this information is not available (e.g. not mentioned in the AIP, etc.), then the pilot should take into account Table 8 or 9 below, as applicable, when determining the DH/MDH:

Table 8

Runway type minima — aeroplanes

Runway type	**Lowest DH/MDH (ft)**
PA runway, category I	200
NPA runway	250
Non-instrument runway	Circling minima as shown in Table 1 in NCC.OP.112

Table 9

Type of runway/FATO minima — helicopters

Type of runway/FATO	**Lowest DH/MDH (ft)**
PA runway, category I NPA runway Non-instrument runway	200
Instrument FATO FATO	200 250

Table 8 does not apply to helicopter PinS approaches with instructions to 'proceed VFR'.

The following GM1 NCO.OP.111 is inserted:

GM1 NCO.OP.111 Aerodrome operating minima — 2D and 3D approach operations

APPROACH OPERATIONS — VERTICAL PATH CONTROL FOR NPA

(a) During a 3D instrument approach operation (using both lateral and vertical navigation guidance), the displayed vertical path should be followed continuously. The approach may be continued to DA/H, at which point a missed approach must be initiated if visual reference is not acquired.

(b) During a 2D instrument approach operation (using lateral navigation guidance only) flown using the continuous descent final approach (CDFA) technique, the vertical path should be approximated continuously by:

(1) choosing an appropriate vertical speed;

(2) cross-checking level against position along the approach; and

(3) adapting the vertical speed as required.

The approach may be continued to DA/H or the missed approach point (MAPt) (whichever is reached first), at which point a missed approach must be initiated if visual reference is not acquired. There is no MDH for an NPA flown using the CDFA technique. An aircraft may descend briefly below the DH on an NPA flown using the CDFA technique, in the same way as it may on a PA or APV.

(c) During a 2D instrument approach operation (using lateral navigation guidance only) flown using the step-down (non-CDFA) technique, the vertical path consists of a sequence of one or more descents to the next published level (i.e. the MDA/H or height at the next stepdown fix). The aircraft may fly level at the MDA/H until reaching the MAPt, where a missed approach must be initiated if visual reference is not acquired.

The CDFA technique has substantially improved safety performance in commercial air transport operations with complex motor-powered aircraft. In lighter, more manoeuvrable aircraft, operated by a single pilot, which may be accustomed to shorter and steeper visual approaches, there may sometimes be advantages to a step-down technique. Due consideration should be given to the choice of vertical path control at the planning stage of flight.

The following GM2 NCO.OP.111 is inserted:

GM2 NCO.OP.111 Aerodrome operating minima — 2D and 3D approach operations

DH/MDH — CALCULATION OF DA/MDA

NCO.OP.111 refers to DH and MDH because the rule compares heights with other heights (system minima, minimum DH in the AFM, etc.). Usually, the DH or MDH will be converted to DA or MDA for operational use by adding the threshold elevation.

The following GM3 NCO.OP.111 is inserted:

GM3 NCO.OP.111 Aerodrome operating minima — 2D and 3 D approach operations

DH/MDH — PinS APPROACHES WITH VIRTUAL DESTINATION

For PinS approaches with instructions to 'proceed VFR' that are not associated with a runway/FATO/operating site, DH/MDH can be established with reference to the ground below the MAPt.

GM1 NCO.OP.112 is replaced by the following:

GM1 NCO.OP.112 Aerodrome operating minima — circling operations with aeroplanes

SUPPLEMENTAL INFORMATION

[…]

(b) Conduct of flight — general:

[…]

(3) for these procedures, the applicable visibility is the ~~meteorological~~ flight visibility.

(c) Instrument approach followed by visual manoeuvring (circling) without prescribed tracks:

(1) When the aeroplane is on the initial instrument approach, before visual reference is established, but not below MDA/H — the aeroplane should follow the corresponding instrument approach procedure (IAP) until the appropriate instrument MAPt is reached.

(2) At the beginning of the level flight phase at or above the MDA/H, the instrument approach track ~~determined by radio navigation aids, RNAV, RNP or ILS, microwave landing system (MLS) or GBAS landing system (GLS)~~ should be maintained until the pilot:

[…]

(iii) is able to determine the aeroplane's position in relation to the runway of intended landing with the aid of the appropriate ~~external~~ visual references.

[…]

The following GM2 NCO.OP.112 is inserted:

GM2 NCO.OP.112 Aerodrome operating minima — circling operations with aeroplanes

DH/MDH — CALCULATION OF DA/MDA

NCO.OP.112 refers to MDH because the rule compares heights with other heights (minimum circling height, OCH, etc.). Usually, the MDH will be converted to MDA for operational use by adding the aerodrome elevation.

The following AMC1 NCO.OP.115 is inserted:

AMC1 NCO.OP.115 Departure and approach procedures — aeroplanes and helicopters

ARRIVALS AND DEPARTURES UNDER IFR WHERE NO INSTRUMENT FLIGHT PROCEDURES ARE PUBLISHED

When arriving or departing under IFR to/from an aerodrome or operating site with no published instrument flight procedure, the pilot-in-command should ensure that sufficient obstacle clearance is available for safe operation. This may be achieved, for example, by climbing or descending visually when below a minimum altitude at which obstacle clearance is known to exist.

When operating IFR in uncontrolled airspace, separation from other aircraft remains the responsibility of the pilot-in-command. The pilot-in-command should also comply with any flight planning and communication requirements designated by the CAA under SERA.4001(b)(3) and SERA.5025(b). Any ATC clearance required to enter controlled airspace must be obtained prior to entry.

The following AMC1 NCO.OP.125(b) is inserted:

AMC1 NCO.OP.125(b) Fuel/energy and oil supply – aeroplanes and helicopters

PLANNING CRITERIA – FINAL RESERVE FUEL/ENERGY

The final reserve fuel (FRF)/energy should be no less than the required fuel/energy to fly:

(a) for aeroplanes:

(1) for 10 minutes at maximum continuous cruise power at 1 500 ft (450 m) above the destination under VFR by day, taking off and landing at the same aerodrome/landing site, and always remaining within sight of that aerodrome/landing site;

(2) for 30 minutes at holding speed at 1 500 ft (450 m) above the destination under VFR by day; and (3) for 45 minutes at holding speed at 1 500 ft (450 m) above the destination or destination alternate aerodrome under VFR flights by night and IFR; and

(b) for helicopters:

(1) for 10 minutes at best-range speed under VFR by day, taking off and landing at the same aerodrome/landing site, and always remaining within 25 NM of that aerodrome/landing site, when needed for the purpose of specialised operations;

(2) for 20 minutes at best-range speed for other VFR flights; and

(3) for 30 minutes at holding speed at 1 500 ft (450 m) above the destination or destination alternate aerodrome under IFR.

The following AMC2 NCO.OP.125(b) is inserted:

AMC2 NCO.OP.125(b) Fuel/energy and oil supply – aeroplanes and helicopters

FINAL RESERVE FUEL/ENERGY

The quantity of the FRF/energy should be planned before flight and be an easily recalled figure against which the pilot-in-command can assess the current fuel/energy state of the aircraft.

The following AMC3 NCO.OP.125(b) is inserted:

AMC3 NCO.OP.125(b) Fuel/energy and oil supply – aeroplanes and helicopters

FINAL RESERVE FUEL/ENERGY PROTECTION

The planned FRF/energy should be protected as a reserve in normal operations. If the fuel/energy on board falls below the FRF/energy, the pilot-in-command should consider this to be an emergency. The FRF/energy should not be used as contingency fuel in normal operations.

When the FRF/energy can no longer be protected, then a fuel/energy emergency should be declared and any landing option explored, including deviating from rules, operational procedures, and methods in the interest of safety (as per point **CAT.GEN.MPA.105(b)**).

The following GM1 NCO.OP.125(b) is inserted:

GM1 NCO.OP.125(b) Fuel/energy and oil supply – aeroplanes and helicopters

LIKELIHOOD OF UNEXPECTED CIRCUMSTANCES TO INCREASE WITH FLIGHT DURATION

The likelihood of unexpected circumstances arising after the aircraft is fuelled may increase with the duration of the planned flight (for example, during a long flight, a problem at the destination aerodrome or operating site is more likely to have occurred than during a short local flight).

The following GM2 NCO.OP.125(b) is inserted:

GM2 NCO.OP.125(b) Fuel/energy and oil supply – aeroplanes and helicopters

PLANNING OF FUEL/ENERGY QUANTITY - HOLDING

When planning the fuel/energy quantity, in case of holding, and if the aircraft documentation does not provide approved data for the holding regime, the pilot should derive the fuel/energy flow data from the long-range/best-range cruise data or, if this is not provided, from the lowest available cruise data in power setting tables.

The following AMC1 NCO.OP.142(b)(1) is inserted:

AMC1 NCO.OP.142(b)(1) Destination alternate aerodromes – instrument approach operations

SBAS-CAPABLE GNSS EQUIPMENT

GNSS system which are authorised under (E)TSO-C145 or (E)TSO-C146 or later revisions are SBAS-capable. Aircraft certified for RNP APCH to LPV minima are considered compliant.

The following AMC2 NCO.OP.142(b)(3) is inserted:

AMC2 NCO.OP.142(b)(3) Destination alternate aerodromes – instrument approach operations

USE OF RAIM FOR SBAS

Where a receiver with RAIM is used to meet the requirement for SBAS, its availability should be predicted by a pre-flight RAIM check, in accordance with AMC1 NCO.GEN.105(c).

GM1 NCO.OP.142 is deleted:

~~GM1 NCO.OP.142 Destination aerodromes — instrument approach operations~~

~~**PBN OPERATIONS**~~

~~The pilot-in-command may only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.~~

The following GM1 NCO.OP.142(b)(4) is inserted:

GM1 NCO.OP.142(b)(4) Destination alternate aerodromes – instrument approach operations

IAPs THAT DO NOT RELY ON SBAS

This instrument approach can be an RNP APCH to LNAV minima. It can also be an RNP APCH to LNAV/VNAV minima using Baro VNAV if the aircraft is equipped with a Baro VNAV function certified for APV.

This requirement is only used for planning purposes to cover the possibility of an SBAS loss; it does not prevent the pilot from flying an approach relying on SBAS if SBAS is available.

The following AMC1 NCO.OP.142(b)(5) is inserted:

AMC1 NCO.OP.142(b)(5) Destination alternate aerodromes — instrument approach operations

APPROPRIATE CONTINGENCY ACTION

An appropriate contingency action is an alternative offered in NCO.OP.142(b)(5) to completion of the planned flight to a safe landing, either at the planned destination or a destination alternate, using normal procedures and using navigation equipment meeting the requirements of NCO.IDE.A/H.100, installed for redundancy or as a backup.

The contingency action should be considered before flight and take into account the information identified by flight preparation according to NCO.OP.135. It may depend on the flight and availability of navigation solutions (satellites, ground navaids, etc.) and weather conditions (IMC, VMC) along the flight.

The contingency action addresses partial loss of navigation capability, such as:

- loss of the stand-alone GNSS equipment;
- local loss of GNSS signal-in-space (e.g. local jamming at destination);
- loss of GNSS signal-in-space.

It should take into account what options remain in case of loss of GNSS signal; for instance, (non-GNSS-based) radar vectoring by ATC, non-GNSS-based navigation systems or the possibility to reach VMC.

Examples of contingency actions include:

- seeking navigational assistance from ATS, using communication and surveillance systems that remain perational, to enable safe descent to VMC;
- the emergency use of navigation equipment not meeting the requirements of NCO.IDE.A/H.100 by making use of the provisions in NCO.GEN.105(e);
- descent over water or very flat terrain to levels with reduced (but reasonable) obstacle clearance; and
- unusually long periods of dead reckoning.

The following GM1 NCO.OP.143 is inserted:

GM1 NCO.OP.143 Destination alternate aerodromes planning minima — aeroplanes

MINIMUM SAFE IFR HEIGHT

For the purpose of NCO.OP.143, the minimum safe IFR height is the height above the aerodrome of the lowest level compatible with SERA.5015(b) for en-route flight at a point from which visual flight to the aerodrome could reasonably be commenced.

The following GM1 NCO.OP.144 is inserted:

GM1 NCO.OP.144 Destination alternate aerodromes planning minima — helicopters

MINIMUM SAFE IFR HEIGHT

For the purpose of NCO.OP.144, the minimum safe IFR height is the height above the aerodrome of the lowest level compatible with SERA.5015(b) for en-route flight at a point from which visual flight to the aerodrome could reasonably be commenced.

The following AMC1 NCO.OP.147 is inserted:

AMC1 NCO.OP.147 Refuelling with engine(s) running and/or rotors turning - helicopters

CHECKLIST - HELICOPTERS

(a) Before commencing a refuelling with rotors turning, the pilot-in-command should conduct a risk assessment, assessing the complexity of the activity in order to determine the hazards and associated risks inherent in the operation, and establish mitigating measures.

(b) Refuelling with rotors turning should be performed in accordance with a checklist. Based on the risk assessment, the pilot-in-command should establish a checklist appropriate to the activity and aircraft used, taking into account this AMC.

(c) The checklist should cover relevant elements of **GM1 NCO.SPEC.105**.

(d) The checklist that is relevant to the duties of the pilot-in-command, crew members, and task specialists should be readily accessible.

(e) The checklist should be regularly reviewed and updated, as appropriate.

The following GM1 NCO.OP.147 is inserted:

GM1 NCO.OP.147 Refuelling with engine(s) running and/or rotors turning - helicopters

PROCEDURES – HELICOPTERS

AMC1 SPO.OP.157 and **GM1 SPO.OP.157** provide a generic framework for the development of standard operating procedures (SOPs) for refuelling with the rotors turning.

The following AMC1 NCO.OP.175 is inserted:

AMC1 NCO.OP.175 Take-off conditions — aeroplanes and helicopters

METEOROLOGICAL CONDITIONS FOR TAKE-OFF — AEROPLANES

(a) When the reported visibility is below that required for take-off and RVR is not reported, a take-off should only be commenced if the pilot-in-command can determine that the visibility along the take-off runway/area is equal to or better than the required minimum.

(b) When no reported visibility or RVR is available, a take-off should only be commenced if the pilot-in-command can determine that the RVR/VIS along the take-off runway/area is equal to or better than the required minimum.

The following GM1 NCO.OP.185(b) & (c) is inserted:

GM1 NCO.OP.185(b)&(c) In-flight fuel/energy management

‘MINIMUM FUEL’ DECLARATION

(a) The pilot-in-command may consider reporting the remaining fuel/energy endurance after a ‘MINIMUM FUEL’ or ‘MAYDAY MAYDAY MAYDAY FUEL’ declaration. Note: For Part-NCO operators, the FRF/energy varies; therefore, the ATC may not be aware of the amount of the remaining fuel/energy endurance.

(b) The ‘MINIMUM FUEL’ declaration informs the ATC that all planned landing options have been reduced to a specific aerodrome or operating site of intended landing, and that for helicopters, no other landing site is available. It also informs the ATC that any change to the existing clearance may result in landing with less than the planned FRF/energy. This is not an emergency situation but an indication that an emergency situation is possible, should any additional delay occur.

The pilot should not expect any form of priority handling as a result of a ‘MINIMUM FUEL’ declaration. However, the ATC should advise the flight crew of any additional expected delays, as well as coordinate with other ATC units when transferring the control of the aircraft, to ensure that the other ATC units are aware of the flight’s fuel/energy state.

(c) The requirement for declaring ‘MINIMUM FUEL’ and ‘MAYDAY MAYDAY MAYDAY FUEL’ applies only to controlled flights; however, these declarations may also be made during uncontrolled flights if the pilot-in-command considers this advisable.

AMC1 NCO.OP.210 is replaced by the following:

AMC1 NCO.OP.210 Commencement and continuation of approach — aeroplanes and helicopters

VISUAL REFERENCES ~~FOR NPA, APV AND CAT I OPERATIONS~~

(a) For a straight-in approach, a~~A~~t DH or MDH, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot:

(1) elements of the approach lighting system;

(2) the threshold;

(3) the threshold markings;

(4) the threshold lights;

(5) the threshold identification lights;

(6) the visual glide path ~~slope~~ indicator;

(7) the touchdown zone (TDZ) or ~~touchdown zone~~ TDZ markings;

(8) the ~~touchdown zone~~ TDZ lights;

(9) FATO/runway edge lights; ~~or~~

~~(10) other visual references specified in the operations manual.~~

(10) for helicopter PinS approaches, the identification beacon light and visual ground reference;

(11) for helicopter PinS approaches, the identifiable elements of the environment defined on the instrument chart; or

(12) for helicopter PinS approaches with instructions to 'proceed VFR', sufficient visual cues to determine that the conditions for VFR are met.

(b) For a circling approach, the required visual reference is the runway environment.

The following AMC2 NCO.OP.210 is inserted:

AMC2 NCO.OP.210 Commencement and continuation of approach — aeroplanes and helicopters

RVR MINIMA FOR CONTINUED APPROACH

(a) The controlling RVR should be the touchdown RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

(c) If neither the touchdown RVR nor the midpoint RVR is reported, then NCO.OP.210(a) is not applicable.

The following GM1 NCO.OP.210 is inserted:

GM1 NCO.OP.210 Commencement and continuation of approach — aeroplanes and helicopters

APPLICATION OF RVR REPORTS

(a) There is no prohibition on the commencement of an approach based on reported RVR. The restriction in NCO.OP.210 applies only if the RVR is reported and applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or into the final approach segment (FAS) as applicable.

(b) If a deterioration in the RVR is reported once the aircraft is below 1 000 ft on the FAS, as applicable, then there is no requirement for the approach to be discontinued. In this situation, the normal visual reference requirements would apply at the DA/H.

(c) Where additional RVR information is provided (e.g. midpoint and stop end), this is advisory; such information may be useful to the pilot in order to determine whether there will be sufficient visual reference to control the aircraft during roll-out and taxi.

(d) If the RVR is less than the RVR calculated in accordance with AMC3 NCO.OP.110, a go-around is likely to be necessary since visual reference may not be established at the DH, or at the MDH at a point where a stable approach to landing in the TDZ remains possible. Similarly, in the absence of an RVR report, the reported visibility may indicate that a go-around is likely. The pilot-in-command should consider available options, based on a thorough assessment of risk, such as diverting to an alternate, before commencing the approach.

The following AMC1 NCO.IDE.A.195(a) is inserted:

AMC1 NCO.IDE.A.195(a) Navigation equipment

NAVIGATION EQUIPMENT — RNAV SUBSTITUTION

An RNAV system may be used to substitute for conventional navigation aids and radio equipment, without monitoring of the raw data from conventional navigation aids, under the following conditions:

SCOPE OF RNAV SUBSTITUTION

(a) RNAV substitution may be used in all the phases of flight except:

(1) to provide lateral guidance in the FAS of an IAP; and

(2) to substitute for DME, if a DME transceiver is either not installed on the aircraft or found to be unserviceable before flight.

SUITABILITY OF THE RNAV SYSTEM FOR RNAV SUBSTITUTION

(b) The RNAV system should meet:

(1) at least the requirements of (E)TSO-C129/-C196/-C145/-C146 (or later equivalent standards); and

(2) the requirements of NCO.OP.116(a) for RNAV 1, RNP 1 or RNP APCH as regards its installation in the aircraft.

OPERATING PROCEDURE

(c) The pilot-in-command is responsible for:

(1) ensuring that any procedure and waypoints used are retrieved from a navigation database which meets the requirements of NCO.IDE.A.205;

(2) verifying waypoint sequence, reasonableness of track angles, and distances of any overlay procedure used;

(3) applying pre-flight procedures associated with GNSS use (e.g. RAIM check if applicable); and

(4) complying with any limitation on RNAV substitution in the AFM.

PILOT COMPETENCE

(d) The pilot-in-command should be aware of the limitations of RNAV substitution.

AIRSPACE LIMITATIONS

(e) RNAV substitution should not be applied on any procedure where RNAV substitution has been indicated as ‘not authorised’ by an AIP entry or a notice to airmen (NOTAM).

CONTINGENCY PLANNING

(f) Nothing in this AMC relieves the pilot-in-command from compliance with NCO.IDE.A.195(b) which requires sufficient navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment shall allow safe navigation according to the flight plan, or an appropriate contingency action, to be completed safely.

The following GM1 NCO.IDE.A.195(a) is inserted:

GM1 NCO.IDE.A.195(a) Navigation equipment

NAVIGATION EQUIPMENT — SCOPE OF RNAV SUBSTITUTION

(a) Applications of RNAV substitution include use to:

(1) determine aircraft position relative to or distance from a VOR, marker, DME fix or a named fix defined by a VOR radial or NDB bearing;

(2) navigate to or from a VOR, or NDB, except as lateral guidance in the FAS of an IAP;

(3) hold over a VOR, NDB, or DME fix;

(4) fly an arc based upon DME;

(5) fly an overlay of a conventional departure, arrival, approach or route except as lateral guidance in the FAS of an IAP.

(b) RNAV substitution for ADF, marker and VOR may be used where airborne and/or ground-based equipment is not available.

(c) RNAV substitution for DME may be used where the ground-based DME transponder is unserviceable or the airborne DME transceiver is found to be unserviceable in flight. Caution must be exercised by the pilot-in-command when calculating and using GNSS distances to the active waypoint as reference points are often different.

The following GM2 NCO.IDE.A.195(a) is inserted:

GM2 NCO.IDE.A.195(a) Navigation equipment

NAVIGATION EQUIPMENT — SUITABILITY OF THE RNAV SYSTEM FOR RNAV SUBSTITUTION

GNSS (E)TSOs are referenced in AMC1 NCO.IDE.A.195(a) since most of the aircraft conducting NCO are equipped with an RNAV stand-alone system which exclusively bases its positioning on GNSS.

The following GM3 NCO.IDE.A.195(a) is inserted:

GM3 NCO.IDE.A.195(a) Navigation equipment

NAVIGATION EQUIPMENT — RNAV SUBSTITUTION — OPERATING PROCEDURE

Although RNAV substitution may not be used for lateral guidance in the FAS, this does not preclude the use of the RNAV system to fly the FAS, provided that raw data from the associated conventional navigation aids is monitored.

The following AMC1 NCO.IDE.A.195(b) is inserted:

AMC1 NCO.IDE.A.195(b) Navigation equipment

APPROPRIATE CONTINGENCY ACTION

An appropriate contingency action is an alternative offered in NCO.IDE.A.195(b) to completion of the planned flight to a safe landing, either at the planned destination or a destination alternate, using normal procedures and using navigation equipment meeting the requirements of NCO.IDE.A.100, installed for redundancy or as a backup.

The contingency action should be considered before flight and take into account the information identified by flight preparation according to NCO.OP.135. It may depend on the flight and availability of navigation solutions (satellites, ground navaids, etc.) and weather conditions (IMC, VMC) along the flight.

The contingency action addresses partial loss of navigation capability. An appropriate contingency action to meet the requirements of NCO.IDE.A.195(b) does not rely on the performance of any function of the item of equipment whose potential failure is being considered. For example, in considering the failure of a VOR/LOC/DME receiver, none of the functions of that receiver should be relied upon in the contingency action.

Examples of contingency actions include:

— seeking navigational assistance from ATS, using communication, navigation and surveillance systems that remain operational, to enable a safe instrument approach or a safe descent to VMC;

— unusually long periods of dead reckoning.

A contingency action is required such that the failure of one item of navigation equipment has a reasonable likelihood of a safe outcome to the flight, consistent with other risks to which the operation is exposed.

The following AMC1 NCO.IDE.H.195(a) is inserted:

AMC1 NCO.IDE.H.195(a) Navigation equipment

NAVIGATION EQUIPMENT — RNAV SUBSTITUTION

An RNAV system may be used to substitute for conventional navigation aids and radio equipment, without monitoring of the raw data from conventional navigation aids, under the conditions defined in AMC1 NCO.IDE.A.195(a).

The following GM1 NCO.IDE.H.195(a) is inserted:

GM1 NCO.IDE.H.195(a) Navigation equipment

NAVIGATION EQUIPMENT — SCOPE OF RNAV SUBSTITUTION

(a) Applications of RNAV substitution include use to:

(1) determine aircraft position relative to or distance from a VOR, marker, DME fix or a named fix defined by a VOR radial or NDB bearing;

(2) navigate to or from a VOR, or NDB, except as lateral guidance in the FAS of an IAP;

(3) hold over a VOR, NDB, or DME fix;

(4) fly an arc based upon DME;

(5) fly an overlay of a conventional departure, arrival, approach or route except as lateral guidance in the FAS of an IAP.

(b) RNAV substitution for ADF, marker and VOR may be used where airborne and/or ground-based equipment is not available.

(c) RNAV substitution for DME may be used where the ground-based DME transponder is unserviceable or the airborne DME transceiver is found to be unserviceable in flight. Caution must be exercised by the pilot-in-command when calculating and using GNSS distances to the active waypoint as reference points are often different.

The following GM2 NCO.IDE.H.195(a) is inserted:

GM2 NCO.IDE.H.195(a) Navigation equipment

NAVIGATION EQUIPMENT — SUITABILITY OF THE RNAV SYSTEM FOR RNAV SUBSTITUTION

GNSS (E)TSOs are referenced in AMC1 NCO.IDE.A.195(a) since most of the aircraft conducting NCO are equipped with an RNAV stand-alone system which exclusively bases its positioning on GNSS.

The following GM3 NCO.IDE.H.195(a) is inserted:

GM3 NCO.IDE.H.195(a) Navigation equipment

NAVIGATION EQUIPMENT — RNAV SUBSTITUTION — OPERATING PROCEDURE

Although RNAV substitution may not be used for lateral guidance in the FAS, this does not preclude the use of the RNAV system to fly the FAS, provided that raw data from the associated conventional navigation aids is monitored.

The following AMC1 NCO.IDE.H.195(b) is inserted:

AMC1 NCO.IDE.H.195(b) Navigation equipment

APPROPRIATE CONTINGENCY ACTION

An appropriate contingency action is an alternative offered in NCO.IDE.H.195(b) to completion of the planned flight to a safe landing, either at the planned destination or a destination alternate, using normal procedures and using navigation equipment meeting the requirements of NCO.IDE.H.100, installed for redundancy or as a backup.

The contingency action should be considered before flight and take into account the information identified by flight preparation according to NCO.OP.135. It may depend on the flight and availability of navigation solutions (satellites, ground navaids, etc.) and weather conditions (IMC, VMC) along the flight.

The contingency action addresses partial loss of navigation capability. An appropriate contingency action to meet the requirements of NCO.IDE.H.195(b) does not rely on the performance of any function of the item of equipment whose potential failure is being considered. For example, in considering the failure of a VOR/LOC/DME receiver, none of the functions of that receiver should be relied upon in the contingency action.

Examples of contingency actions include:

- — seeking navigational assistance from ATS, using communication, navigation and surveillance systems that remain operational, to enable a safe instrument approach or a safe descent to VMC;
- — unusually long periods of dead reckoning.

A contingency action is required such that the failure of one item of navigation equipment has a reasonable likelihood of a safe outcome to the flight, consistent with other risks to which the operation is exposed.

The following AMC1 NCO.SPEC.115(a) is inserted:

AMC1 NCO.SPEC.115(a) Crew responsibilities

PILOT DUTIES — RECORDING OF FLIGHT TIME

(a) The pilot should only record flight time for the purpose of meeting experience requirements in specialised operations defined in AMC1 ORO.FC.146(f) and AMC1 SPO.SPEC.HESLO.100 if NCO.SPEC applies.

(b) The list of specialised operations in GM1 NCO.SPEC.100 may be used for the purpose of (a).

Annex VIII – Part-SPO

Annex VII is amended as follows:

The following AMC1 SPO.GEN.105(a) is inserted:

AMC1 SPO.GEN.105(a) Crew responsibilities

CREW DUTIES — RECORDING OF FLIGHT TIME

The following should apply for the purpose of recording flight time in accordance with AMC2 SPO.OP.230(i) and meeting experience requirements in specialised operations defined in AMC1 ORO.FC.146(e); (f) & (g) and AMC1 SPO.SPEC.HESLO.100:

(a) Flight time should be recorded as flight time in a specialised activity if one of the following applies:

(1) The aircraft has external equipment or is in a configuration that requires the use of a specific SOP.

(2) A task specialist is on board, or a person indispensable to the mission is being carried in accordance with Article 5(7).

(3) The crew applies a specific SOP in the course of a specialised activity.

(b) Irrespective of the scope of Part-SPO, if none of the above applies (e.g. ferry flights), the flight time should not be recorded as a specialised activity.

(c) The list of specialised operations in GM1 SPO.GEN.005 may be used for the purpose of (a).

AMC1 SPO.GEN.140 (a)(18) is replaced by the following:

AMC1 SPO.GEN.140(a)(18) Documents, manuals and information to be carried

APPROPRIATE METEOROLOGICAL INFORMATION

The appropriate meteorological information should be relevant to the planned operation, as specified in point (a) of point **MET.TR.215** of Annex V (Part-MET) to UK Regulation (EU) 2017/373, and comprise the following:

(a) the meteorological information that is specified in point (e) of point **MET.TR.215** of Part-MET; and

(b) supplemental meteorological information:

  (1) information other than that specified in point (a), which should be based on data from certified meteorological service providers; or

  (2) information from other reliable sources of meteorological information that should be evaluated by the operator.

The following GM1 SPO.GEN.140 (a)(18) is inserted:

GM1 SPO.GEN.140(a)(18) Documents, manuals and information to be carried

DATA FROM CERTIFIED METEOROLOGICAL SERVICE PROVIDERS

In addition to GM1 SPO.GEN.140(a)(18) and in the context of point (b)(1) of AMC1 SPO.GEN.140(a)(18), the operator may consider that any meteorological information that is provided by the organisation within the scope of the meteorological information included in the flight documentation defined in point (e) of point **MET.TR.215** of Part-MET should originate only from authoritative sources or certified providers, and should not be transformed or tampered, except for the purpose of presenting the data in the correct format. The organisation's process should provide assurance that the integrity of such service is preserved in the data to be used by both flight crews and operators, regardless of their form.

The following GM2 SPO.GEN.140 (a)(18) is inserted:

GM2 SPO.GEN.140(a)(18) Documents, manuals and information to be carried

INFORMATION FROM OTHER RELIABLE SOURCES OF METEOROLOGICAL INFORMATION

In the context of point (b)(2) of AMC1 SPO.GEN.140(a)(18), reliable sources of meteorological information are organisations that are able to provide an appropriate level of data assurance in terms of accuracy and integrity. The operator may consider in the evaluation that the organisation has a quality assurance system in place that covers source selection, acquisition/import, processing, validity period check, and distribution phase of data.

The following GM3 SPO.GEN.140 (a)(18) is inserted:

GM3 SPO.GEN.140(a)(18) Documents, manuals and information to be carried

SUPPLEMENTAL METEOROLOGOCAL INFORMATION AND SUPPLEMENTARY INFORMATION

Supplemental meteorological information: when operating under specific provisions and without the meteorological information from a certified service provider, the operator should use 'supplemental meteorological information', such as digital imagery. Related information can be found in point (e)(4) of AMC1 CAT.OP.MPA.192.

Supplementary information: it is included in point (a) of AMC1 CAT.GEN.MPA.180(a)(18**)** and refers to meteorological information to be reported in specific cases such as freezing precipitation, blowing snow, thunderstorm, etc.

The following GM1 SPO.OP.101 is inserted:

GM1 SPO.OP.101 Altimeter check and settings

ALTIMETER-SETTING PROCEDURES

The following paragraphs of ICAO Doc 8168 (PANS-OPS), Volume III provide recommended guidance on how to develop the altimeter setting procedure:

(a) 3.2 'Pre-flight operational test';

(b) 3.3 'Take-off and climb';

(c) 3.5 'Approach and landing'.

The following GM1 SPO.OP.105 is inserted:

GM1 SPO.OP.105 Specification of isolated aerodromes - aeroplanes

USE OF AN AERODROME AS ANA ISOLATED AERODROME

The concept of an isolated aerodrome allows the operator to use aerodromes that would otherwise be impossible or impractical to use with sufficient fuel to fly to the destination aerodrome and then to a destination alternate aerodrome, provided that operational criteria are used to ensure a safe-landing option, for example by specifying a point of no return (PNR). If alternate fuel is carried, the operator is not required to consider the aerodrome as isolated and use the aforementioned operational criteria.

AMC2 SPO.OP.110 is replaced by the following:

~~AMC2~~ AMC7 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

VISUAL APPROACH OPERATIONS

(…)

AMC3 SPO.OP.110 is replaced by the following:

AMC2~~AMC3~~ SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

GENERAL

(a) The aerodrome operating minima should not be lower than those ~~as~~ specified in ~~SPO.OP.111~~ AMC5 SPO.OP.110 or AMC4 SPO.OP.110(c).

(b) Whenever practical, approaches should be flown as stabilised approaches (SAps). Different procedures may be used for a particular approach to a particular runway.

(c) Whenever practical, non-precision approaches should be flown using the continuous descent final approach (CDFA) technique. Different procedures may be used for a particular approach to a particular runway.

(d) For approaches not flown using the CDFA technique: when calculating the minima in accordance with ~~NCC.OP.111~~ AMC5 SPO.OP.110, the applicable minimum runway visual range (RVR) should be increased by 200 m for Category A and B aeroplanes and by 400 m for Category C and D aeroplanes, provided that the resulting RVR/converted meteorological visibility (CMV) value does not exceed 5 000 m. SAp or CDFA should be used as soon as facilities are improved to allow these techniques.

AMC4 SPO.OP.110 is replaced by the following:

AMC3~~AMC4~~ SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

TAKE-OFF OPERATIONS ~~WITH COMPLEX MOTOR-POWERED AIRCRAFT~~

(a) General~~:~~

(1) Take-off minima should be expressed as visibility (VIS) or RVR limits, taking into account all relevant factors for each aerodrome planned to be used and aircraft characteristics and equipment. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions, e.g. ceiling, should be specified.

(2) The pilot-in-command should not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than the applicable minima for landing at that aerodrome, unless a weather-permissible take-off alternate aerodrome is available.

(3) When the reported meteorological visibility VIS is below that required for take-off and the RVR is not reported, a take-off should only be commenced if the pilot-in-command can determine that the visibility along the take-off runway/area is equal to or better than the required minimum.

(4) When no reported meteorological visibility VIS or RVR is available, a take-off should only be commenced if the pilot-in-command can determine that the visibility RVR/ VIS along the take-off runway/area is equal to or better than the required minimum.

(b) Visual reference:

(1) The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and a continued take-off after failure of the critical engine.

(2) For night operations, ground lights should be available to illuminate the runway/final approach and take-off area (FATO) and any obstacles the prescribed runway lights should be in operation to mark the runway and any obstacles.

TAKE-OFF OPERATIONS WITH HELICOPTERS AND COMPLEX MOTOR-POWERED AEROPLANES

(c) Required RVR/ or VIS visibility:

(1) Complex motor-powered aeroplanesAeroplanes:

(i) For aeroplanes, the take-off minima specified by the operator should be expressed as RVR/VIS values not lower than those specified in Table 1.A.

(ii) When reported RVR or meteorological visibility is not available, the pilot-in-command should not commence take-off unless he/she can determine that the actual conditions satisfy the applicable take-off minima.

(i) For multi-engined aeroplanes with such performance that in the event of a critical engine failure at any point during take-off the aeroplane can either stop or continue the take-off to a height of 1 500 ft above the aerodrome while clearing obstacles by the required margins, the take-off minima specified by the operator should be expressed as RVR or VIS values not lower than those specified in Table 1.

(ii) Multi-engined aeroplanes without the performance to comply with the conditions in (c)(1)(i) in the event of a critical engine failure may need to reland immediately and to see and avoid obstacles in the take-off area. Such aeroplanes may be operated to the following take-off minima provided that they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the specified height:

(A) The take-off minima specified by the operator should be based upon the height from which the one-engine-inoperative (OEI) net take-off flight path can be constructed.

(B) The RVR minima used should not be lower than either of the values specified in Table 1 or Table 2.

(iii) For single-engined complex aeroplane operations, the take-off minima specified by the operator should be expressed as RVR/CMV values not lower than those specified in Table 1 below.

Unless the operator makes use of a risk period, whenever the surface in front of the runway does not allow for a safe forced landing, the RVR/CMV values should not be lower than 800 m. In this case, the proportion of the flight to be considered starts at the lift-off position and ends when the aeroplane is able to turn back and land on the runway in the opposite direction or glide to the next landing site in case of power loss.

(iv) When the RVR or the VIS is not available, the pilot-in-command should not commence take-off unless he or she can determine that the actual conditions satisfy the applicable take-off minima.

Table 1~~1.A~~

Take-off — aeroplanes (without ~~low visibility take-off (~~LVTO~~)~~ approval) RVR~~/~~ or VIS

Facilities	RVR~~/~~ or VIS (m)*
Day only: Nil**	500
Day: at least runway edge lights or runway centre line markings Night: at least runway edge lights or runway centre line lights and runway end lights	400

*~~:~~ The reported RVR~~/~~ or VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

**~~:~~ The pilot is able to continuously identify the take-off surface and maintain directional control.

Table 2

Take-off — aeroplanes (without an LVTO approval)

Assumed engine failure height above the take-off runway versus RVR or VIS

Assumed engine failure height above the take-off runway (ft)	RVR or VIS (m) *
<50	400
51–100	400
101–150	400
151–200	500
201–300	1 000
>300 or if no positive take-off flight path can be constructed	1 500

*: The reported RVR or VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

(2) Helicopters:

(i) For helicopters having a mass where it is possible to reject the take-off and land on the FATO in case of the critical engine failure being recognised at or before the take-off decision point (TDP), the operator should specify an RVR/ or VIS as take-off minimum in accordance with Table 31.H.

(ii) For all other cases, the pilot-in-command should operate to take-off minima of 800 m RVR/ or VIS and remain clear of cloud during the take-off manoeuvre until reaching the performance capabilities of (c)(2)(i).

~~(iii) Table 5 for converting reported meteorological visibility to RVR should not be used for calculating take-off minima.~~

(iii) For point-in-space (PinS) departures to an initial departure fix (IDF), the take-off minima should be selected to ensure sufficient guidance to see and avoid obstacles and return to the heliport if the flight cannot continue visually to the IDF.

Table 31.H

Take-off — helicopters (without LVTO approval)

RVR/Visibility or VIS

Onshore aerodromes or operating sites with instrument flight rules (IFR) departure procedures	**RVR/ or VIS (m) ****
No light and no markings (day only)	400 or the rejected take-off distance, whichever is the greater
No markings (night)	800
Runway edge/FATO light and centre line marking	400
Runway edge/FATO light, centre line marking and relevant RVR information	400
Offshore helideck*	
Two-pilot operations	400
Single-pilot operations	500

*: The take-off flight path to be free of obstacles.

** On PinS departures to IDF, VIS should not be less than 800 m and ceiling should not be less than 250ft.

AMC5 SPO.OP.110 is replaced by the following:

AMC4AMC5 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

~~TAKE-OFF OPERATIONS WITH OTHER-THAN COMPLEX MOTOR-POWERED AIRCRAFT~~

~~(a) General:~~

(1) ~~Take-off minima should be expressed as VIS or RVR limits, taking into account all relevant factors for each aerodrome planned to be used and aircraft characteristics. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions, e.g. ceiling, it should be specified.~~

(2) ~~When the reported meteorological visibility is below that required for take-off and RVR is not reported, a take-off should only be commenced if the pilot-in-command can determine that the visibility along the take-off runway/area is equal to or better than the required minimum.~~

(3) ~~When no reported meteorological visibility or RVR is available, a take-off should only be commenced if the pilot-in-command can determine that the RVR/VIS along the take-off runway/area is equal to or better than the required minimum.~~

(b) ~~Visual reference:~~

(1) ~~The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and a continued take-off after failure of the critical engine.~~

(2) ~~For night operations, ground lights should be available to illuminate the runway/final approach and take-off area (FATO) and any obstacles.~~

DETERMINATION OF THE DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The decision height (DH) to be used for a 3D approach operation or a 2D approach operation flown using the continuous descent final approach (CDFA) technique should not be lower than the highest of:

(1) the obstacle clearance height (OCH) for the category of aircraft;

(2) the published approach procedure DH or minimum descent height (MDH) where applicable;

(3) the system minima specified in Table 4;

(4) the minimum DH permitted for the runway specified in Table 5; or

(5) the minimum DH specified in the AFM or equivalent document, if stated.

(b) The MDH for a 2D approach operation flown not using CDFA technique should not be lower than the highest of:

(1) the OCH for the category of aircraft;

(2) the published approach procedure MDH where applicable;

(3) the system minimum specified in Table 4;

(4) the lowest MDH permitted for the runway specified in Table 5; or

(5) the lowest MDH specified in the AFM, if stated.

DETERMINATION OF THE DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

(c) The DH or MDH should not be lower than the highest of:

(1) the OCH for the category of aircraft;

(2) the published approach procedure DH or MDH where applicable;

(3) the system minima specified in Table 4;

(4) the lowest DH or MDH permitted for the runway/FATO specified in Table 6 if applicable; or

(5) the lowest DH or MDH specified in the AFM, if stated.

Table 4

System minima — all aircraft

Facility	**Lowest DH/MDH (ft)**
ILS/MLS/GLS	200
GNSS/SBAS (LPV)	200*
Precision approach radar (PAR)	200
GNSS/SBAS (LP)	250
GNSS (LNAV)	250
GNSS/Baro VNAV (LNAV/VNAV)	250
Helicopter PinS approach	250**
LOC with or without DME	250
SRA (terminating at ½ NM)	250
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350
VOR	300
VOR/DME	250
NDB	350
NDB/DME	300
VDF	350

* For localiser performance with vertical guidance (LPV), a DH of 200 ft may be used only if the published final approach segment (FAS) datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250 ft.

** For PinS approaches with instructions to 'proceed VFR' to an undefined or virtual destination, the DH or MDH should be with reference to the ground below the missed approach point (MAPt).

Table 5

Runway type minima — aeroplanes

Runway type	**Lowest DH/MDH (ft)**
Precision approach (PA) runway, category I	200
NPA runway	250
Non-instrument runway	Circling minima as shown in Table 1 in SPO.OP.112

Table 6

Type of runway/FATO versus lowest DH/MDH — helicopters

Type of runway/FATO	Lowest DH/MDH (ft)
PA runway, category I NPA runway Non-instrument runway	200
Instrument FATO FATO	200 250

Table 6 does not apply to helicopter PinS approaches with instructions to 'proceed VFR'.

AMC6 SPO.OP.110 is deleted:

~~AMC6 SPO.OP.110 Aerodrome operating minima – aeroplanes and helicopters~~

~~CRITERIA FOR ESTABLISHING RVR/CMV~~

~~(a) In order to qualify for the lowest allowable values of RVR/CMV specified in Table 4.A of AMC7 SPO.OP.110, the instrument approach should meet at least the following facility requirements and associated conditions:~~

~~(1) Instrument approaches with designated vertical profile up to and including 4.5° for Category A and B aeroplanes, or 3.77° for Category C and D aeroplanes, where the facilities are:~~

~~(i) instrument landing system (ILS)/microwave landing system (MLS)/GBAS landing system (GLS)/precision approach radar (PAR)); or~~

~~(ii) approach procedure with vertical guidance (APV); and~~

~~where the final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes.~~

~~(2) Instrument approach operations flown using the CDFA technique with a nominal vertical profile, up to and including 4.5° for Category A and B aeroplanes, or 3.77° for Category C and D aeroplanes, where the facilities are non-directional beacon (NDB), NDB/distance measuring equipment (DME), VHF omnidirectional radio range (VOR), VOR/DME, localiser (LOC), LOC/DME, VHF direction finder (VDF), surveillance radar approach (SRA) or global navigation satellite system (GNSS)/lateral navigation (LNAV), with a final approach segment of at least 3 NM, which also fulfil the following criteria:~~

~~(i) the final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes;~~

~~(ii) the final approach fix (FAF) or another appropriate fix where descent is initiated is available, or distance to threshold (THR) is available by flight management system (FMS)/area navigation (NDB/DME) or DME; and~~

~~(iii) the missed approach point (MAPt) is determined by timing, the distance from FAF to THR is ≤ 8 NM.~~

~~(3) Instrument approaches where the facilities are NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA or GNSS/LNAV, not fulfilling the criteria in (a)(2), or with an minimum descent height (MDH) ≥ 1 200 ft.~~

(b) The missed approach operation, after an approach operation has been flown using the CDFA technique, should be executed when reaching the decision height/altitude (DH/A) or the MAPt, whichever occurs first. The lateral part of the missed approach procedure should be flown via the MAPt unless otherwise stated on the approach chart.

AMC7 SPO.OP.110 is replaced by the following:

AMC5AMC7 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

DETERMINATION OF RVR OR VIS /CMV/VIS MINIMA FOR NPA, APV, CAT I FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The minimum RVR/CMV/VIS should be the highest of the values specified in Table 3 and Table 4.A but not greater than the maximum values specified in Table 4.A, where applicable.

(b) The values in Table 3 should be derived from the formula below:

required RVR/VIS (m) = [(DH/MDH (ft) x 0.3048) / tanα] – length of approach lights (m);

where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 3 up to 3.77° and then remaining constant.

(c) If the approach is flown with a level flight segment at or above MDA/H, 200 m should be added for Category A and B aeroplanes and 400 m for Category C and D aeroplanes to the minimum RVR/CMV/VIS value resulting from the application of Table 3 and Table 4.A.

(d) An RVR of less than 750 m as indicated in Table 3 may be used:

(1) for CAT I operations to runways with full approach lighting system (FALS), runway touchdown zone lights (RTZL) and runway centreline lights (RCLL);

(2) for CAT I operations to runways without RTZL and RCLL when using an approved head-up guidance landing system (HUDLS), or equivalent approved system, or when conducting a coupled approach or flight-director-flown approach to a DH. The ILS should not be published as a restricted facility; and

(3) for APV operations to runways with FALS, RTZL and RCLL when using an approved head-up display (HUD).

(e) Lower values than those specified in Table 3 may be used for HUDLS and autoland operations if approved in accordance with Annex V (Part SPA), Subpart E.

(f) The visual aids should comprise standard runway day markings and approach and runway lights as specified in Table 2. The CAA may approve that RVR values relevant to a basic approach lighting system (BALS) are used on runways where the approach lights are restricted in length below 210 m due to terrain or water, but where at least one cross-bar is available.

(g) For night operations or for any operation where credit for runway and approach lights is required, the lights should be on and serviceable, except as provided for in Table 6 of AMC6 SPO.OP.110.

(h) For single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:

(1) an RVR of less than 800 m as indicated in Table 3 may be used for CAT I approaches provided any of the following is used at least down to the applicable DH:

(i) a suitable autopilot, coupled to an ILS, MLS or GLS that is not published as restricted; or

(ii) an approved HUDLS, including, where appropriate, enhanced vision system (EVS), or equivalent approved system;

(2) where RTZL and/or RCLL are not available, the minimum RVR/CMV should not be less than 600 m; and

(3) an RVR of less than 800 m as indicated in Table 3 may be used for APV operations to runways with FALS, RTZL and RCLL when using an approved HUDLS, or equivalent approved system, or when conducting a coupled approach to a DH equal to or greater than 250 ft.

Table 2: Approach lighting systems

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centreline, Barrette centreline
IALS	Simple approach lighting system (HIALS 420 – 719 m) single source, Barrette
BALS	Any other approach lighting system (HIALS, MIALS or ALS 210 – 419 m)
NALS	Any other approach lighting system (HIALS, MIALS or ALS < 210 m) or no approach lights

Note: HIALS: high intensity approach lighting system; MIALS: medium intensity approach lighting system; ALS: approach lighting system.

Table 3: RVR/CMV vs. DH/MDH

DH or MDH			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			See (d), (e), (h) above for RVR < 750/800 m			
Ft			**RVR/CMV (m)**			
200	-	210	550	750	1 000	1 200
211	-	220	550	800	1 000	1 200
221	-	230	550	800	1 000	1 200
231	-	240	550	800	1 000	1 200
241	-	250	550	800	1 000	1 300
251	-	260	600	800	1 100	1 300
261	-	280	600	900	1 100	1 300
281	-	300	650	900	1 200	1 400
301	-	320	700	1 000	1 200	1 400
321	-	340	800	1 100	1 300	1 500
341	-	360	900	1 200	1 400	1 600
361	-	380	1 000	1 300	1 500	1 700
381	-	400	1 100	1 400	1 600	1 800
401	-	420	1 200	1 500	1 700	1 900
421	-	440	1 300	1 600	1 800	2 000
441	-	460	1 400	1 700	1 900	2 100
461	-	480	1 500	1 800	2 000	2 200
481		500	1 500	1 800	2 100	2 300
501	-	520	1 600	1 900	2 100	2 400
521	-	540	1 700	2 000	2 200	2 400
541	-	560	1 800	2 100	2 300	2 500
561	-	580	1 900	2 200	2 400	2 600
581	-	600	2 000	2 300	2 500	2 700
601	-	620	2 100	2 400	2 600	2 800
621	-	640	2 200	2 500	2 700	2 900
641	-	660	2 300	2 600	2 800	3 000
661	-	680	2 400	2 700	2 900	3 100

DH or MDH			Class of lighting facility			
			FALS	IALS	BALS	NALS
			See (d), (e), (h) above for RVR < 750/800 m			
Ft			RVR/CMV (m)			
681	-	700	2 500	2 800	3 000	3 200
701	-	720	2 600	2 900	3 100	3 300
721	-	740	2 700	3 000	3 200	3 400
741	-	760	2 700	3 000	3 300	3 500
761	-	800	2 900	3 200	3 400	3 600
801	-	850	3 100	3 400	3 600	3 800
851	-	900	3 300	3 600	3 800	4 000
901	-	950	3 600	3 900	4 100	4 300
951	-	1 000	3 800	4 100	4 300	4 500
1 001	-	1 100	4 100	4 400	4 600	4 900
1 101	-	1 200	4 600	4 900	5 000	5 000
1 201 and above			5 000	5 000	5 000	5 000

Table 4.A: CAT I, APV, NPA – aeroplanes

Minimum and maximum applicable RVR/CMV (lower and upper cut-off limits)

Facility/conditions	RVR/CMV (m)	Aeroplane category			
		A	B	C	D
ILS, MLS, GLS, PAR, GNSS/SBAS, GNSS/VNAV	Min	According to Table 3			
	Max	1 500	1 500	2 400	2 400
NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV with a procedure that fulfils the criteria in AMC4 NCC.OP.110 (a)(2).	Min	750	750	750	750
	Max	1 500	1 500	2 400	2 400
For NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV: — not fulfilling the criteria in AMC4 NCC.OP.110 (a)(2)., or — with a DH or MDH ≥ 1 200 ft	Min	1 000	1 000	1 200	1 200
	Max	According to Table 3 if flown using the CDFA technique, otherwise an add-on of 200/400 m applies to the values in Table 3 but not to result in a value exceeding 5 000 m.			

(a) The RVR or VIS for straight-in instrument approach operations should not be less than the greatest of the following:

(1) the minimum RVR or VIS for the type of runway used according to Table 7;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 8; or

(3) the minimum RVR according to the visual and non-visual aids and on-board equipment used according to Table 9.

If the value determined in (1) is a VIS, then the result is a minimum VIS. In all other cases, the result is a minimum RVR.

(b) For Category A and B aeroplanes, if the RVR or VIS determined in accordance with (a) is greater than 1 500 m, then 1 500 m should be used.

(c) If the approach is flown with a level flight segment at or above the MDA/H, then 200 m should be added to the RVR calculated in accordance with (a) and (b) for Category A and B aeroplanes and 400 m should be added to the RVR calculated in accordance with (a) for Category C and D aeroplanes.

(d) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights, runway end lights and approach lights as defined in Table 8.

Table 7

Type of runway versus minimum RVR or VIS — aeroplanes

Type of runway	Minimum RVR or VIS (m)
PA runway, category I	RVR 550
NPA runway	RVR 750
Non-instrument runway	VIS according to Table 1 in SPO.OP.112 (Circling minima)

Table 8

RVR versus DH/MDH

DH or MDH (ft)			Class of lighting facility			
			FALS	IALS	BALS	NALS
			RVR (m)			
200	—	210	550	750	1 000	1 200
211	—	240	550	800	1 000	1 200
241	—	250	550	800	1 000	1 300
251	—	260	600	800	1 100	1 300
261	—	280	600	900	1 100	1 300
281	—	300	650	900	1 200	1 400
301	—	320	700	1 000	1 200	1 400
321	—	340	800	1 100	1 300	1 500
341	—	360	900	1 200	1 400	1 600
361	—	380	1 000	1 300	1 500	1 700
381	—	400	1 100	1 400	1 600	1 800
401	—	420	1 200	1 500	1 700	1 900
421	—	440	1 300	1 600	1 800	2 000
441	—	460	1 400	1 700	1 900	2 100
461	—	480	1 500	1 800	2 000	2 200
481	—	500	1 500	1 800	2 100	2 300
501	—	520	1 600	1 900	2 100	2 400
521	—	540	1 700	2 000	2 200	2 400
541	—	560	1 800	2 100	2 300	2 400
561	—	580	1 900	2 200	2 400	2 400
581	—	600	2 000	2 300	2 400	2 400
601	—	620	2 100	2 400	2 400	2 400
621	—	640	2 200	2 400	2 400	2 400
641	—	660	2 300	2 400	2 400	2 400
661	and above		2 400	2 400	2 400	2 400

Table 9

Visual and non-visual aids and/or on-board equipment versus minimum RVR — aeroplanes

Type of approach	Facilities	Lowest RVR (m)	
		Multi-pilot operations	Single-pilot operations
3D operations Final approach track offset ≥15° for category A and B aeroplanes or ≥5° for Category C and D aeroplanes	runway touchdown zone lights (RTZL) and runway centre line lights (RCLL)	[no limitation]	
	without RTZL and RCLL but using HUDLS or equivalent system; autopilot or flight director to the DH	[no limitation]	600 m
	no RTZL and RCLL, not using HUDLS or equivalent system or autopilot to the DH	750 m	800 m
3D operations	runway touchdown zone lights (RTZL) and runway centre line lights (RCLL) and Final approach track offset >15° for category A and B aeroplanes or final approach track offset >5° for Category C and D aeroplanes	800 m	1 000 m
	without RTZL and RCLL but using HUDLS or equivalent system; autopilot or flight director to the DH and Final approach track offset >15° for category A and B aeroplanes or final approach track offset >5° for Category C and D aeroplanes	800 m	1 000 m
2D operations	Final approach track offset ≥ 15° for Category A and B aeroplanes or ≥ 5° for Category C and D aeroplanes	750 m	800 m
	Final approach track offset > 15° for Category A and B aeroplanes	1 000 m	1 000 m

	Final approach track offset > 5° for Category C and D aeroplanes	1 200 m	1 200 m

Table 10

Approach lighting systems — aeroplanes

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centre line, barrette centre line
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS < 210 m) or no approach lights

(e) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable except as provided for in Table 15.

(f) Where any visual or non-visual aid specified for the approach and assumed to be available in the determination of operating minima is unavailable, revised operating minima will need to be determined.

AMC8 SPO.OP.110 is replaced by the following:

AMC6~~AMC8~~ SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

DETERMINATION OF RVR~~/CMV/~~ OR VIS ~~MINIMA~~ FOR ~~NPA,~~ TYPE A INSTRUMENT APPROACH AND TYPE B CAT I INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

~~(a) For non-precision approach (NPA) operations, the minima specified in Table 4.1.H should apply:~~

~~(1) where the missed approach point is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required;~~

~~(2) for night operations, ground lights should be available to illuminate the FATO/runway and any obstacles; and~~

~~(3) for single-pilot operations, the minimum RVR is 800 m or the minima in Table 4.2.H, whichever is higher.~~

~~(b) For CAT I operations, the minima specified in Table 4.2.H should apply:~~

~~(1) for night operations, ground light should be available to illuminate the FATO/runway and any obstacles;~~

~~(2) for single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:~~

~~(i) an RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, MLS or GLS, in which case normal minima apply; and~~

~~(ii) the DH applied should not be less than 1.25 times the minimum use height for the autopilot.~~

~~**Table 4.1.H: Onshore minima**~~

~~**MDH /DH (ft) ***~~	~~**Approach lighting systems vs RVR/CMV (m) **, *****~~			
	~~**FALS**~~	~~**IALS**~~	~~**BALS**~~	~~**NALS**~~
~~250–299~~	~~600~~	~~800~~	~~1 000~~	~~1 000~~
~~300–449~~	~~800~~	~~1 000~~	~~1 000~~	~~1 000~~
~~450 and above~~	~~1 000~~	~~1 000~~	~~1 000~~	~~1 000~~

~~*: 'MDH/DH' refers to the initial calculation of MDH/DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to MDA/DA.~~

~~**: The tables are only applicable to conventional approaches with a nominal descent slope of not greater than 4°. Greater descent slopes will usually require that visual glideslope guidance (e.g. precision approach path indicator (PAPI)) is also visible at the MDH.~~

~~**Table 4.2.H: Onshore CAT I minima**~~

~~**DH (ft) ***~~	~~**Approach lighting systems vs RVR/CMV (m) **, *****~~			
	~~**FALS**~~	~~**IALS**~~	~~**BALS**~~	~~**NALS**~~
~~200~~	~~500~~	~~600~~	~~700~~	~~1 000~~
~~201–250~~	~~550~~	~~650~~	~~750~~	~~1 000~~
~~251–300~~	~~600~~	~~700~~	~~800~~	~~1 000~~
~~301 and above~~	~~750~~	~~800~~	~~900~~	~~1 000~~

~~*: 'DH' refers to the initial calculation of DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to DA.~~

~~**: The table is applicable to standard approaches with a glide slope up to and including 4°.~~

~~IALS comprise FATO/runway markings, 420 – 719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.~~

~~BALS comprise FATO/runway markings, < 420 m of HI/MI approach lights, any length of LI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.~~

~~NALS comprise FATO/runway markings, FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.~~

(a) For IFR operations, the RVR or VIS should not be less than the greatest of:

(1) the minimum RVR or VIS for the type of runway/FATO used according to Table 11;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 12; or

(3) for PinS operations with instructions to ‘proceed visually’, the distance between the MAPt of the PinS and the FATO or its approach light system.

If the value determined in (1) is a VIS, then the result is a minimum VIS. In all other cases, the result is a minimum RVR.

(b) For PinS operations with instructions to ‘proceed VFR’, the VIS should be compatible with visual flight rules.

(c) For Type A instrument approaches where the MAPt is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required.

(d) An RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, MLS, GLS or LPV, in which case normal minima apply.

(e) For night operations, ground lights should be available to illuminate the FATO/runway and any obstacles.

(f) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights and runway end lights and approach lights as specified in Table 13.

(g) For night operations or for any operation where credit for runway and approach lights as defined in Table 13 is required, the lights should be on and serviceable except as provided for in Table 15.

Table 11

Type of runway/FATO versus minimum RVR — helicopters

Type of runway/FATO	**Minimum RVR or VIS (m)**
PA runway, category I NPA runway Non-instrument runway	RVR 550
Instrument FATO FATO	RVR 550 RVR or VIS 800

Table 12

Onshore helicopter instrument approach minima

DH/MDH (ft)	**Facilities versus RVR (m)**			
	FALS	**IALS**	**BALS**	**NALS**
200	550	600	700	1 000
201–249	550	650	750	1 000
250–299	600*	700*	800	1 000
300 and above	750*	800	900	1 000

* Minima on 2D approach operations should be no lower than 800 m.

Table 13

Approach lighting systems — helicopters

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centre line, barrette centre line
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS < 210 m) or no approach lights

AMC9 SPO.OP.110 is replaced by the following:

AMC8~~AMC9~~ SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

CONVERSION OF ~~REPORTED METEOROLOGICAL~~ VISIBILITY TO ~~RVR/~~CMV — AEROPLANES

~~(a) A conversion from meteorological visibility to RVR/CMV should not be used:~~

~~(1) when the reported RVR is available;~~

~~(2) for calculating take-off minima; and~~

~~(3) for other RVR minima less than 800.~~

~~(b) If the RVR is reported as being above the maximum value assessed by the aerodrome operator, e.g. 'RVR more than 1 500 m', it should not be considered as a reported value for (a)(1).~~

~~(c) When converting meteorological visibility to RVR in circumstances other than those in (a), the conversion factors specified in Table 5should be used.~~

The following conditions apply to the use of CMV instead of RVR:

(a) If the reported RVR is not available, a CMV may be substituted for the RVR, except:

(1) to satisfy take-off minima; or

(2) for the purpose of continuation of an approach in LVO.

(b) If the minimum RVR for an approach is more than the maximum value assessed by the aerodrome operator, then CMV should be used.

(c) In order to determine CMV from visibility:

(1) for flight planning purposes, a factor of 1.0 should be used;

(2) for purposes other than flight planning, the conversion factors specified in Table 14 should be used.

Table 14~~5~~

Conversion of reported ~~meteorological visibility~~ VIS to RVR/CMV

Light elements in operation	**RVR/CMV = reported VIS x ~~meteorological visibility x~~**	
	Day	**Night**
HI approach and runway lights	1.5	2.0

Any type of light installation other than above	1.0	1.5
No lights	1.0	not applicable

AMC10 SPO.OP.110 is replaced by the following:

AMC9~~AMC10~~ SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT — COMPLEX MOTOR-POWERED AIRCRAFT

(a) General

These instructions are intended for both pre-flight and in-flight use. It is, however, not expected that the pilot-in-command would consult such instructions after passing 1 000 ft above the aerodrome. If failures of ground aids are announced at such a late stage, the approach could be continued at the pilot-in-command's discretion. If failures are announced before such a late stage in the approach, their effect on the approach should be considered as described in Table 15~~6~~ and, if considered necessary, the approach should be abandoned.

(b) Conditions applicable to Table 15~~6~~:

(1) multiple failures of runway/FATO lights other than those indicated in Table 15~~6~~ should not be acceptable;

(2) ~~deficiencies~~ failures of approach and runway/FATO lights are acceptable at the same time, and the most demanding consequence should be applied ~~treated separately~~; and

(3) failures other than ILS or ~~,~~ MLS affect the RVR only and not the DH.

Table 15~~6~~

Failed or downgraded equipment — effect on landing minima

Failed or downgraded equipment	**Effect on landing minima**	
	~~CAT I~~ Type B	**~~APV, NPA~~ Type A**
~~ILS/MLS~~ Navaid standby transmitter	No effect	
Outer marker	No effect if ~~replaced by height check at 1 000 ft~~ the required height or glide path can be checked using other means, e.g. DME fix	APV — not applicable NPA with FAF: no effect unless used as FAF If the FAF cannot be identified (e.g. no method available for timing of descent), ~~non-precision~~ NPA operations cannot be conducted
Middle marker	No effect	No effect unless used as MAPt
RVR assessment systems	No effect	
Approach lights	Minima as for NALS	
Approach lights except the last 210 m	Minima as for BALS	

Failed or downgraded equipment	Effect on landing minima	
	~~CAT I~~ Type B	~~APV, NPA~~ Type A
Approach lights except the last 420 m	Minima as for IALS	
Standby power for approach lights	No effect	
Edge lights, threshold lights and runway end lights	Day — no effect Night — not allowed	
~~Centreline~~ Centre line lights	Aeroplanes: No effect if flight director (F/D), HUDLS or autoland; otherwise RVR 750 m. Helicopters: No effect on CAT I and SA CAT I approach operations.	No effect
~~Centreline~~ Centre line lights spacing increased to 30 m	No effect	
~~Touchdown zone~~ TDZ lights	Aeroplanes: No effect if F/D, HUDLS or autoland; otherwise RVR 750 m. Helicopters: No effect.	No effect
Taxiway lighting system	No effect	

AMC11 SPO.OP.110 is replaced by the following:

AMC10~~AMC11~~ SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT — OTHER-THAN COMPLEX MOTOR-POWERED AIRCRAFT

[…]

(b) ~~A minimum RVR of 750 m should be used for CAT I operations in the absence of centreline lines and/or touchdown zone lights.~~

~~(c)~~ Where approach lighting is partly unavailable, minima should take account of the serviceable length of approach lighting.

GM1 SPO.OP.110 is replaced by the following:

GM1 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

AIRCRAFT CATEGORIES

(a) Aircraft categories should be based on the indicated airspeed at threshold (V_{AT}), which is equal to the stalling speed (V_{SO}) multiplied by 1.3 or where published 1-g (gravity) stall speed (V_{S1g})

multiplied by 1.23 in the landing configuration at the maximum certified landing mass. If both V_{SO} and V_{S1g} are available, the higher resulting V_{AT} should be used.

(b) The aircraft categories specified in Table 16 should be used.

Table 16

Aircraft categories corresponding to VAT values

Aircraft category	V_{AT}
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 following GM5 SPO.OP.110 is inserted:

GM5 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

APPROACH LIGHTING SYSTEMS — ICAO, FAA

The following table provides a comparison of the ICAO and FAA specifications.

Table 17

Approach lighting systems — ICAO and FAA specifications

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	ICAO: CAT I lighting system (HIALS ≥ 720 m) distance coded centre line, barrette centre line FAA: ALSF1, ALSF2, SSALR, MALSR, high- or medium-intensity and/or flashing lights, 720 m or more
IALS	ICAO: simple approach lighting system (HIALS 420–719 m) single source, barrette FAA: MALSF, MALS, SALS/SALSF, SSALF, SSALS, high- or medium-intensity and/or flashing lights, 420–719 m
BALS	Any other approach lighting system (e.g. HIALS, MALS or ALS 210–419 m) FAA: ODALS, high- or medium-intensity or flashing lights 210–419 m
NALS	Any other approach lighting system (e.g. HIALS, MALS or ALS <210 m) or no approach lights

The following GM6 SPO.OP.110 is inserted:

GM6 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

IAPs — SBAS OPERATIONS

(a) SBAS LPV operations with a DH of 200 ft depend on an SBAS approved for operations down to a DH of 200 ft.

(b) The following systems are in operational use or in a planning phase:

(1) European geostationary navigation overlay service (EGNOS), operational in Europe;

(2) wide area augmentation system (WAAS), operational in the USA;

(3) multi-functional satellite augmentation system (MSAS), operational in Japan;

(4) system of differential correction and monitoring (SDCM), planned by Russia;

(5) GPS-aided geo-augmented navigation (GAGAN) system, planned by India; and

(6) satellite navigation augmentation system (SNAS), planned by China.

The following GM7 SPO.OP.110 is inserted:

GM7 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

MEANS TO DETERMINE THE REQUIRED RVR BASED ON DH AND LIGHTING FACILITIES

The values in Table 8 are derived from the formula below:

RVR (m) = [(DH/MDH (ft) × 0.3048)/tanα] – length of approach lights (m),

where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 8 up to 3.77° and then remaining constant. An upper RVR limit of 2 400 m has been applied to the table.

The following GM8 SPO.OP.110 is inserted:

GM8 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

USE OF DH FOR NPAs FLOWN USING THE CONTINUOUS DESCENT FINAL APPROACH (CDFA) TECHNIQUE

The safety of using the MDH as DH in CDFA operations has been verified by at least two independent analyses concluding that a CDFA using MDH as DH without any add-on is safer than the traditional step-down and level flight NPA operation. A comparison was made between the safety level of using MDH as DH without an add-on with the well-established safety level resulting from the ILS collision risk model (CRM). The NPA used was the most demanding, i.e. most tightly designed NPA, which offers the least additional margins. It should be noted that the design limits of the ILS approach design, e.g. the maximum glide path (GP) angle of 3.5 degrees, must be observed for the CDFA in order to keep the validity of the comparison.

There is a wealth of operational experience in Europe confirming the above-mentioned analytical assessments. It cannot be expected that each operator is able to conduct similar safety assessments, and this is not necessary. The safety assessments already performed take into account the most demanding circumstances at hand, like the most tightly designed NPA procedures and other 'worst-case scenarios'. The assessments naturally focus on cases where the controlling obstacle is located in the missed approach area.

However, it is necessary for operators to assess whether their cockpit procedures and training are adequate to ensure minimal height loss in case of a go-around manoeuvre. Suitable topics for the safety assessment required by each operator may include:

— understanding of the CDFA concept including use of the MDA/H as DA/H;

— cockpit procedures that ensure flight on speed, on path, and with proper configuration and energy management;

— cockpit procedures that ensure gradual decision-making; and

— identification of cases where an increase of the DA/H may be necessary because of non-standard circumstances, etc.

The following GM9 SPO.OP.110 is inserted:

GM9 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

INCREMENTS SPECIFIED BY THE CAA

Additional increments to the published minima may be specified by the CAA in order to take into account certain operations, such as downwind approaches, single-pilot operations, or approaches flown not using the CDFA technique.

The following GM10 SPO.OP.110 is inserted:

GM10 SPO.OP.110 Aerodrome operating minima —aeroplanes and helicopters

USE OF COMMERCIALLY AVAILABLE INFORMATION

When an operator uses commercially available information to establish aerodrome operating minima, the operator remains responsible for ensuring that the information used is accurate and suitable for its operation, and that the aerodrome operating minima are calculated in accordance with the method specified in Part C of its operations manual.

The operator should apply the procedures in ORO.GEN.205 ‘Contracted activities’.

The following GM1 SPO.OP.110(b)(5) is inserted:

GM1 SPO.OP.110(b)(5) Aerodrome operating minima

VISUAL AND NON-VISUAL AIDS AND INFRASTRUCTURE

‘Visual and non-visual aids and infrastructure’ refers to all equipment and facilities required for the procedure to be used for the intended instrument approach operation. This includes but is not limited to lights, markings, ground- or space-based radio aids, etc.

GM1 SPO.OP.112 is replaced by the following:

GM1 SPO.OP.112 Aerodrome operating minima — circling operations with aeroplanes

SUPPLEMENTAL INFORMATION

(a) The purpose of this ~~G~~guidance ~~M~~material is to provide operators with supplemental information regarding the application of aerodrome operating minima in relation to circling approaches.

(b) Conduct of flight — general:

(1) the MDH and ~~obstacle clearance height (~~OCH~~)~~ included in the procedure are referenced to aerodrome elevation;

(2) the MDA is referenced to mean sea level;

(3) for these procedures, the applicable visibility is the ~~meteorological visibility~~ VIS; and

(4) operators should provide tabular guidance of the relationship between height above threshold and the in-flight visibility required to obtain and sustain visual contact during the circling manoeuvre.

(c) Instrument approach followed by visual manoeuvring (circling) without prescribed tracks:

(1) When the aeroplane is on the initial instrument approach, before visual reference is stabilised, but not below the MDA/H, ~~—~~the aeroplane should follow the corresponding instrument approach procedure (IAP) until the appropriate instrument MAPt is reached.

(2) At the beginning of the level flight phase at or above the MDA/H, the instrument approach track ~~determined by the radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~ should be maintained until the pilot:

(i) estimates that, in all probability, visual contact with the runway of intended landing or the runway environment will be maintained during the entire circling procedure;

(ii) estimates that the aeroplane is within the circling area before commencing circling; and

(iii) is able to determine the aeroplane's position in relation to the runway of intended landing with the aid of the appropriate ~~external~~ visual references.

(3) If the pilot cannot comply with the conditions in (c)(2) at the MAPt ~~When reaching the published instrument MAPt and the conditions stipulated in (c)(2) are unable to be established by the pilot~~, then a missed approach should be ~~carried out~~executed in accordance with ~~that~~ the ~~instrument approach procedure~~ IAP.

(4) After the aeroplane has left the track of the initial instrument approach, the flight phase outbound from the runway should be limited to an appropriate distance, which is required to align the aeroplane onto the final approach. Such manoeuvres should be conducted to enable the aeroplane to:

(i) ~~to~~ attain a controlled and stable descent path to the intended landing runway; and

(ii) ~~to~~ remain within the circling area and in ~~a~~ such a way that visual contact with the runway of intended landing or runway environment is maintained at all times.

(5) Flight manoeuvres should be carried out at an altitude/height that is not less than the circling MDA/H.

(6) Descent below the MDA/H should not be initiated until the threshold of the runway to be used has been appropriately identified. The aeroplane should be in a position to continue with a normal rate of descent and land within the touchdown zone (TDZ).

(d) Instrument approach followed by a visual manoeuvring (circling) with prescribed track.

(1) The aeroplane should remain on the initial ~~instrument approach procedure~~ IAP until one of the following is reached:

(i) the prescribed divergence point to commence circling on the prescribed track; or

(ii) the MAPt.

(2) The aeroplane should be established on the instrument approach track ~~determined by the radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~ in level flight at or above the MDA/H at or by the circling manoeuvre divergence point.

[…]

(8) Unless otherwise specified in the procedure, final descent should not be commenced from the MDA/H until the threshold of the intended landing runway has been identified and the aeroplane is in a position to continue with a normal rate of descent to land within the ~~touchdown zone~~TDZ.

(e) Missed approach

(1) Missed approach during the instrument procedure prior to circling:

If the missed approach procedure is required to be flown when the aeroplane is positioned on the instrument approach track ~~defined by radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~, and before commencing the circling manoeuvre, the published missed approach for the instrument approach should be followed;

[…]

The following AMC1 SPO.OP.115 is inserted:

AMC1 SPO.OP.115 Departure and approach procedures – aeroplanes and helicopters

APPROACH FLIGHT TECHNIQUE — AEROPLANES

(a) All approach operations should be flown as SAp operations.

(b) The CDFA technique should be used for NPA procedures.

AMC2 SPO.OP.116 is replaced by the following:

AMC2 SPO.OP.116 Performance-based navigation – aeroplanes and helicopters

MONITORING AND VERIFICATION

(a) Preflight and general considerations

(1) At navigation system initialisation, the flight crew should confirm that the navigation database is current and verify that the aircraft position has been entered correctly, if required.

(2) The active flight plan, if applicable, should be checked by comparing the charts or other applicable documents with navigation equipment and displays. This includes confirmation of the departing runway and the waypoint sequence, reasonableness of track angles and distances, any altitude or speed constraints, and, where possible, which waypoints are fly-by and which are fly-over. Where relevant, the RF leg arc radii should be confirmed.

(3) The flight crew should check that the navigation aids critical to the operation of the intended PBN procedure are available.

(4) The flight crew should confirm the navigation aids that should be excluded from the operation, if any.

(5) An arrival, approach or departure procedure should not be used if the validity of the procedure in the navigation database has expired.

(6) The flight crew should verify that the navigation systems required for the intended operation are operational.

(b) Departure

(1) Prior to commencing a take-off on a PBN procedure, the flight crew should check that the indicated aircraft position is consistent with the actual aircraft position at the start of the take-off roll (aeroplanes) or lift-off (helicopters).

(2) Where GNSS is used, the signal should be acquired before the take-off roll (aeroplanes) or lift-off (helicopters) commences.

(3) Unless automatic updating of the actual departure point is provided, the flight crew should ensure initialisation on the runway or FATO by means of a manual runway threshold or intersection update, as applicable. This is to preclude any inappropriate or inadvertent position shift after take-off.

(c) Arrival and approach

(1) The flight crew should verify that the navigation system is operating correctly and the correct arrival procedure and runway (including any applicable transition) are entered and properly depicted.

(2) Any published altitude and speed constraints should be observed.

(3) The flight crew should check approach procedures (including alternate aerodromes if needed) as extracted by the system (e.g. CDU flight plan page) or presented graphically on the moving map, in order to confirm the correct loading and the reasonableness of the procedure content.

(4) Prior to commencing the approach operation (before the IAF), the flight crew should verify the correctness of the loaded procedure by comparison with the appropriate approach charts. This check should include:

(i) the waypoint sequence;

(ii) reasonableness of the tracks and distances of the approach legs and the accuracy of the inbound course; and

(iii) the vertical path angle, if applicable.

(d) Altimetry settings for RNP APCH operations using Baro VNAV

(1) Barometric settings

(i) The flight crew should set and confirm the correct altimeter setting and check that the two altimeters provide altitude values that do not differ more than 100 ft at the most at or before the FAF.

(ii) The flight crew should fly the procedure with:

(A) a current local altimeter setting source available — a remote or regional altimeter setting source should not be used; and

(B) the QNH/QFE, as appropriate, set on the aircraft's altimeters.

(2) Temperature compensation

(i) For RNP APCH operations to LNAV/VNAV minima using Baro VNAV:

(A) the flight crew should not commence the approach when the aerodrome temperature is outside the promulgated aerodrome temperature limits for the procedure unless the area navigation system is equipped with approved temperature compensation for the final approach;

(B) when the temperature is within promulgated limits, the flight crew should not make compensation to the altitude at the FAF ~~and DA/H~~; and

(C) since only the final approach segment is protected by the promulgated aerodrome temperature limits, the flight crew should consider the effect of temperature on terrain and obstacle clearance in other phases of flight.

(ii) For RNP APCH operations to LNAV minima, the flight crew should consider the effect of temperature on terrain and obstacle clearance in all phases of flight, in particular on any step-down fix.

(e) Sensor and lateral navigation accuracy selection

(1) For multi-sensor systems, the flight crew should verify, prior to approach, that the GNSS sensor is used for position computation.

(2) Flight crew of aircraft with RNP input selection capability should confirm that the indicated RNP value is appropriate for the PBN operation.

The following AMC1 SPO.OP.131 is inserted:

AMC1 SPO.OP.131 Fuel/energy scheme – fuel/energy planning and in-flight re-planning policy – aeroplanes and helicopters

AEROPLANES

For the fuel/energy planning scheme , the amount of the required usable fuel for a flight should not be less than the sum of the following:

(a) taxi fuel that should take into account the local conditions at the departure aerodrome and the APU consumption;

(b) trip fuel that should include:

(1) fuel for take-off and climb from the aerodrome elevation to the initial cruising level/altitude, taking into account the expected departure routing;

(2) fuel from the top of climb to the top of descent, including any step climb/descent;

(3) fuel from the top of descent to the point where the approach procedure is initiated, taking into account the expected arrival routing; and

(4) fuel for making an approach and landing at the destination aerodrome;

(c) contingency fuel that should be:

(1) 5 % of the planned trip fuel or, in the event of in-flight re-planning, 5 % of the trip fuel for the remainder of the flight; or

(2) an amount to fly for 5 minutes at holding speed at 1 500 ft (450 m) above the destination aerodrome in standard conditions, whichever is higher;

(d) destination alternate fuel that should be:

(1) when the aeroplane is operated with one destination alternate aerodrome:

(i) fuel for a missed approach from the applicable DA/H or MDA/H at the destination aerodrome to the missed-approach altitude, taking into account the complete missed approach procedure;

(ii) fuel for climb from the missed-approach altitude to the cruising level/altitude, taking into account the expected departure routing;

(iii) fuel for cruising from the top of climb to the top of descent, taking into account the expected routing;

(iv) fuel for descent from the top of descent to the point where the approach is initiated, taking into account the expected arrival routing; and

(v) fuel for making an approach and landing at the destination alternate aerodrome;

(2) when the aeroplane is operated with no destination alternate aerodrome, the amount of fuel to hold for 15 minutes at 1 500 ft (450 m) in standard conditions above the destination aerodrome elevation;

(3) when the aerodrome of intended landing is an isolated aerodrome:

(i) for aeroplanes with reciprocating engines, the amount of fuel required to fly either for 45 minutes plus 15 % of the flight time planned for cruising, including the FRF/energy, or for 2 hours, whichever is less; or

(ii) for turbine-engined aeroplanes, the amount of fuel required to fly for 2 hours with normal cruise consumption above the destination aerodrome, including the FRF/energy.

(e) FRF/energy that should not be less than the fuel required to fly:

(1) for 10 minutes at normal cruising altitude under VFR by day, taking off and landing at the same aerodrome/landing site, and always remaining within sight of that aerodrome/landing site;

(2) for 30 minutes at normal cruising altitude for other VFR flights by day; and

(3) for 45 minutes at normal cruising altitude under VFR by night, and under IFR for aeroplanes with reciprocating engines; and

(4) for 30 minutes at holding speed at 1 500 ft (450 m) above the aerodrome elevation in standard conditions, which is calculated according to the estimated mass on arrival under VFR by night and under IFR for turbine-engined aeroplanes,

Note: When the operator follows point (e)(1) for the FRF/energy, the operator should specify in the standard operating procedures (SOPs):

— the type of operation in which such reduced RFR may be used; and

— the methods of reading and calculating the remaining fuel.

(f) additional fuel that should be the amount of fuel that allows the aeroplane to proceed, in the event of an engine failure or loss of pressurisation, from the most critical point along the route to a fuel en-route alternate (fuel ERA) aerodrome in the relevant aircraft configuration, hold there for 15 minutes at 1 500 ft (450 m) above the aerodrome elevation in standard conditions, make an approach, and land;

(g) extra fuel if there are anticipated delays or specific operational constraints; and

(h) discretionary fuel, if required by the pilot-in-command.

HELICOPTERS

(i) The FRF/energy should not be less than the fuel required to fly:

(1) for 10 minutes at best-range speed, provided that the helicopter remains within 25 NM of the aerodrome/operating site of departure, under VFR;

(2) for 20 minutes at best-range speed for flights other than the ones referred to in (i)(1) under VFR; and

(3) for 30 minutes at holding speed at 1 500 ft (450 m) above the destination or destination alternate under IFR.

(j) If point (i)(1) is used for the FRF/energy, the operator should specify in the SOPs:

(1) the type of operation in which such reduced FRF/energy may be used; and

(2) methods of reading and calculating the remaining fuel.

AMC1 SPO.OP.152 is replaced by the following:

AMC1 SPO.OP.152 Destination aerodromes — instrument approach operations

PBN OPERATIONS

~~The pilot-in-command should only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.~~

(a) When the operator intends to use PBN, the operator should either:

(1) demonstrate that the GNSS is robust against loss of capability; or

(2) select an aerodrome as a destination alternate aerodrome only if an IAP that does not rely on a GNSS is available either at that aerodrome or at the destination aerodrome.

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — AEROPLANES/HELICOPTERS

(b) The operator may demonstrate robustness against the loss of capability of the GNSS if all of the following criteria are met:

(1) At flight planning stage, SBAS or GBAS are expected to be available and used.

(2) The failure of a single receiver or system should not compromise the navigation capability required for the intended instrument approach.

(3) The temporary jamming of all GNSS frequencies should not compromise the navigation capability required for the intended route. The operator should provide a procedure to deal with such cases unless other sensors are available to continue on the intended route.

(4) For helicopters only, the duration of a jamming event should be determined as follows:

(i) Considering the average speed and height of a helicopter flight, the duration of a jamming event may be considered to be less than 2 minutes.

(ii) The time needed for the GNSS system to re-start and provide the aircraft position and navigation guidance should also be considered.

(iii) Based on (i) and (ii) above, the operator should establish the duration of the loss of GNSS navigation data due to jamming. This duration should be no less than 3 minutes, and may be no longer than 4 minutes.

(5) The operator should ensure resilience to jamming for the duration determined in (4) above, as follows:

(i) If the altitude of obstacles on both sides of the flight path are higher than the planned altitude for a given segment of the flight, the operator should ensure no excessive drift on either side by relying on navigation sensors such as an inertial system with performance in accordance with the intended function.

(ii) If (i) does not apply and the operator cannot rely on sensors other than GNSS, the operator should develop a procedure to ensure that a drift from the intended route during the jamming event has no adverse consequences on the safety of the flight. This procedure may involve air traffic services.

(6) The operator should ensure that no space weather event is predicted to disrupt the GNSS reliability and integrity at both the destination and the alternate aerodromes.

(7) The operator should verify the availability of RAIM for all phases of flight based on GNSS, including navigation to the alternate aerodrome.

(8) The operator’s MEL should reflect the elements in points (b)(1) and (b)(2).

OPERATIONAL CREDITS

(c) To comply with point SPO.OP.153, when the operator intends to use ‘operational credits’ (e.g. EFVS, SA CAT I, etc.), the operator should select an aerodrome as destination alternate aerodrome only if an approach procedure that does not rely on the same ‘operational credit’ is available either at that aerodrome or at the destination aerodrome.

The following GM2 SPO.OP.152 is inserted:

GM2 SPO.OP.152 Destination aerodromes — instrument approach operations

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — AEROPLANES/HELICOPTERS

(a) Redundancy of on-board systems ensures that no single on-board equipment failure (e.g. antenna, GNSS receiver, FMS, or navigation display failure) results in the loss of the GNSS capability.

(b) Any shadowing of the GNSS signal or jamming of all GNSS frequencies from the ground is expected to be of a very short duration and affect a very small area. Additional sensors or functions such as inertial coasting may be used during jamming events. Jamming should be considered on all segments of the intended route, including the approach.

(c) The availability of GNSS signals can be compromised if space weather events cause 'loss of lock' conditions and more than one satellite signal may be lost on a given GNSS frequency. Until space weather forecasts are available, the operator may use 'nowcasts' as short-term predictions for helicopter flights of short durations.

(d) SBAS also contributes to mitigate space weather effects, both by providing integrity messages and by correcting ionosphere-induced errors.

(e) Even though SBAS should be available and used, RAIM should remain available autonomously. In case of loss of the SBAS, the route and the approach to the destination or alternate should still be flown with an available RAIM function.

(f) When available, GNSS based on more than one constellation and more than one frequency may provide better integrity and redundancy regarding failures in the space segment of the GNSS, jamming, and resilience to space weather events.

AMC1 SPO.OP.155 is replaced by the following:

AMC1 SPO.OP.155 Refuelling with persons embarking, on board or disembarking

OPERATIONAL PROCEDURES — AEROPLANES

(a) Operational procedures should specify that at least the following precautions are taken:

(1) One qualified person should remain at a specified location during fuelling operations with persons on board. This qualified person should be capable of handling emergency procedures concerning fire protection and firefighting ~~fire-fighting~~, handling communications and initiating and directing an evacuation.

(2) Two-way communication should be established and should remain available by the aeroplane's inter-communication system or other suitable means between the ground crew supervising the refuelling and the qualified personnel on board the aeroplane; the involved personnel should remain within easy reach of the system of communication.

(3) Flight crew members and task specialists should be warned that refuelling will take place.

(4) ‘Fasten seat belts’ signs should be off.

(5) ‘No smoking’ signs should be on, together with interior lighting to enable emergency exits to be identified.

(6) Task specialists should be instructed to unfasten their seat belts and refrain from smoking.

(7) If the presence of fuel vapour is detected inside the aeroplane, or any other hazard arises during refuelling, fuelling should be stopped immediately.

(8) The ground area beneath the exits intended for emergency evacuation and slide deployment areas should be kept clear.

(9) Provision should be made for a safe and rapid evacuation.

~~**OPERATIONAL PROCEDURES — HELICOPTERS**~~

~~(b) Operational procedures should specify that at least the following precautions are taken:~~

~~(1) Door(s) on the refuelling side of the helicopter remain closed.~~

~~(2) Door(s) on the non-refuelling side of the helicopter remain open, weather permitting.~~

~~(3) Firefighting facilities of the appropriate scale be positioned so as to be immediately available in the event of a fire.~~

~~(4) Sufficient qualified personnel are on board and be prepared for an immediate emergency evacuation.~~

~~(5) If the presence of fuel vapour is detected inside the helicopter, or any other hazard arises during refuelling, fuelling should be stopped immediately.~~

~~(6) The ground area beneath the exits intended for emergency evacuation be kept clear.~~

~~(7) Provision should be made for a safe and rapid evacuation.~~

The following AMC2 SPO.OP.155 is inserted:

AMC2 SPO.OP.155 Refuelling with persons embarking, on board or disembarking

OPERATIONAL PROCEDURES — HELICOPTERS

When the helicopter rotors are stopped, the efficiency and speed of task specialists disembarking from and re-embarking on board helicopters is such that disembarking before refuelling and re-embarking after refuelling is the general practice. However, if such operations are needed, the operator should refer to AMC1 SPO.OP.157 and AMC2 SPO.OP.157. Operational procedures to be described in the operations manual (OM) should specify that at least the relevant precautions of the aforementioned AMC are taken.

The following AMC1 SPO.OP.157 is inserted:

AMC1 SPO.OP.157 Refuelling with engine(s) and/or rotors turning - helicopters

OPERATIONAL PROCEDURES — NO TASK SPECIALISTS ON BOARD

Operational procedures in the OM should specify that at least the following precautions are taken:

(a) all necessary information should be exchanged in advance with the aerodrome operator, operating site operator, and refuelling operator;

(b) the procedures to be used by crew members should be defined;

(c) the procedures to be used by the operator's ground operations personnel that may be in charge of refuelling or assisting in emergency evacuations should be described;

(d) the operator's training programmes for crew members and for the operator's ground operations personnel should be described;

(e) the minimum distance between the helicopter turning parts and the refuelling vehicle or installations should be defined when the refuelling takes place outside an aerodrome or at an aerodrome where there are no such limitations;

(f) besides any rescue and firefighting services (RFFSs) that are required to be available by aerodrome regulations, an additional handheld fire extinguisher with the equivalent of 5 kg of dry powder should be immediately available and ready for use;

(g) a means for a two-way communication between the crew and the person in charge of refuelling should be defined and established;

(h) if fuel vapour is detected inside the helicopter, or any other hazard arises, refuelling/defuelling should be stopped immediately;

(i) one pilot should stay at the controls, constantly monitor the refuelling, and be ready to shut off the engines and evacuate at all times; and

(j) any additional precautions should be taken, as determined by the risk assessment.

The following AMC2 SPO.OP.157 is inserted:

AMC2 SPO.OP.157 Refuelling with engine(s) and/or rotors turning - helicopters

OPERATIONAL PROCEDURES — TASK SPECIALISTS ON BOARD

In addition to AMC1 SPO.OP.157, for refuelling with task specialists on board, operational procedures in the OM should specify that at least the following precautions are taken:

(a) the positioning of the helicopter and the corresponding helicopter evacuation strategy should be defined taking into account the wind as well as the refuelling facilities or vehicles;

(b) on a heliport, the ground area beneath the exits that are intended for emergency evacuation should be kept clear;

(c) an additional task specialist briefing as well as instructions should be defined, and the 'No smoking' signs should be on unless 'No smoking' placards are installed;

(d) interior lighting should be set to enable identification of emergency exits;

(e) the use of doors during refuelling should be defined: doors on the refuelling side should remain closed, while doors on the opposite side should remain unlocked or, weather permitting, open unless otherwise specified in the AFM; and

(f) at least one suitable person or appropriately trained task specialist capable of implementing emergency procedures for firefighting, communications, as well for initiating and directing an evacuation, should remain at a specified location; this person should not be the qualified pilot at the controls or the person performing the refuelling.

The following GM1 SPO.OP.157 is inserted:

GM1 SPO.OP.157 Refuelling with engine(s) and/or rotors turning - helicopters

RISK ASSESSMENT

The risk assessment should explain why it is not practical to refuel with the engine(s) and rotors stopped, identify the additional hazards, and describe how the additional risks are controlled. Helicopter offshore operations (HOFO) are typical operations where the benefits should outweigh the risks if mitigation measures are taken.

Guidance on safe refuelling practices is contained in ICAO Doc 9137 *Airport Services Manual*, Parts 1 and 8.

The operator's risk assessment may include, but not be limited to, the following risks, hazards and mitigation measures:

(a) risk related to refuelling with rotors turning;

(b) risk related to the shutting down of the engines, including the risk of failures during start-up;

(c) environmental conditions, such as wind limitations, displacement of exhaust gases, and blade sailing;

(d) risk related to human factors and fatigue management, especially for single-pilot operations for long periods of time;

(e) risk mitigation, such as the safety features of the fuel installation, rescue and firefighting (RFF) capability, number of personnel members available, ease of emergency evacuation of the helicopter, etc.;

(f) assessment of the use of radio transmitting equipment;

(g) determination of the use of seat belts; and

(h) review of the portable electronic device (PED) policy.

The following GM1 SPO.OP.190(b) & (d) is inserted:

GM1 SPO.OP.190(b) & (d) Fuel/energy scheme – in-flight fuel/energy management policy

FINAL RESERVE FUEL/ENERGY PROTECTION

To ensure a safe landing, the pilot needs to protect the final reserve fuel (FRF)/energy in accordance with point SPO.OP.131. The objective of the FRF/energy protection is to ensure that a safe landing is made at any aerodrome or operating site when unforeseen circumstances may not allow to safely complete the flight, as originally planned.

When the FRF/energy can no longer be protected, then a fuel emergency needs to be declared, as per point SPO.OP.190(d), and any landing option explored (e.g. for aeroplanes, aerodromes not assessed by the operator, military aerodromes, closed runways), including deviating from rules, operational procedures, and methods in the interest of safety (as per point CAT.GEN.MPA.105(b)).

ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual* and the EASA *Fuel Manual* contain further detailed guidance on the development of a comprehensive in-flight fuel management policy and related procedures.

The following GM1 SPO.OP.190(c) is inserted:

GM1 SPO.OP.190(c) Fuel/energy scheme – in-flight fuel/energy management policy

'MINIMUM FUEL' DECLARATION

The 'MINIMUM FUEL' declaration informs the ATC that all planned landing options have been reduced to a specific aerodrome or operating site of intended landing, and for helicopters, that no other landing site is available. It also informs the ATC that any change to the existing clearance may result in landing with less than the planned FRF/energy. This is not an emergency situation but an indication that an emergency situation is possible, should any additional delay occur.

The pilot should not expect any form of priority handling as a result of a 'MINIMUM FUEL' declaration. However, the ATC should advise the flight crew of any additional expected delays, as well as coordinate with other ATC units when transferring the control of the aircraft, to ensure that the other ATC units are aware of the flight's fuel/energy state.

ICAO Doc 9976 *Flight Planning and Fuel Management (FPFM) Manual* (1st Edition, 2015) and the EASA *Fuel Manual* contain guidance on declaring 'MINIMUM FUEL'.

AMC1 SPO.OP.215 is replaced by the following:

AMC1 SPO.OP.215(a) Commencement and continuation of approach ~~— aeroplanes and helicopters~~

~~VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS~~ MINIMUM RVR FOR CONTINUATION OF APPROACH — AEROPLANES

(a) The controlling RVR should be the touchdown RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

(c) Where the RVR is not available, CMV should be used, except for the purpose of continuation of an approach in LVO in accordance with AMC8 SPO.OP.110.

~~(a) NPA, APV and CAT I operations~~

~~At DH or MDH, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot:~~

~~(1) elements of the approach lighting system;~~

~~(2) the threshold;~~

~~(3) the threshold markings;~~

~~(4) the threshold lights;~~

~~(5) the threshold identification lights;~~

~~(6) the visual glide slope indicator;~~

~~(7) the touchdown zone or touchdown zone markings;~~

~~(8) the touchdown zone lights;~~

~~(9) FATO/runway edge lights; or~~

~~(10) other visual references specified in the operations manual.~~

~~(b) Lower than standard category I (LTS CAT I) operations~~

~~At DH, the visual references specified below should be distinctly visible and identifiable to the pilot:~~

~~(1) a segment of at least three consecutive lights, being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of them; and~~

~~(2) this visual reference should include a lateral element of the ground pattern, such as an approach light crossbar or the landing threshold or a barrette of the touchdown zone light unless the operation is conducted utilising an approved HUDLS usable to at least 150 ft.~~

~~(c) CAT II or other-than standard category II (OTS CAT II) operations~~

~~At DH, the visual references specified below should be distinctly visible and identifiable to the pilot:~~

~~(1) a segment of at least three consecutive lights, being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of them; and~~

~~(2) this visual reference should include a lateral element of the ground pattern, such as an approach light crossbar or the landing threshold or a barrette of the touchdown zone light unless the operation is conducted utilising an approved HUDLS to touchdown.~~

~~(d) CAT III operations~~

~~(1) For CAT IIIA operations and for CAT IIIB operations conducted either with fail-passive flight control systems or with the use of an approved HUDLS: at DH, a segment of at least three consecutive lights, being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of them is attained and can be maintained by the pilot.~~

~~(2) For CAT IIIB operations conducted either with fail-operational flight control systems or with a fail-operational hybrid landing system using a DH: at DH, at least one centreline light is attained and can be maintained by the pilot.~~

~~(3) For CAT IIIB operations with no DH there is no requirement for visual reference with the runway prior to touchdown.~~

~~(e) Approach operations utilising EVS — CAT I operations~~

~~(1) At DH or MDH, the following visual references should be displayed and identifiable to the pilot on the EVS:~~

~~(i) elements of the approach light; or~~

~~(ii) the runway threshold, identified by at least one of the following:~~

~~(A) the beginning of the runway landing surface,~~

~~(B) the threshold lights, the threshold identification lights; or~~

~~(C) the touchdown zone, identified by at least one of the following: the runway touchdown zone landing surface, the touchdown zone lights, the touchdown zone markings or the runway lights.~~

~~(2) At 100 ft above runway threshold elevation at least one of the visual references specified below should be distinctly visible and identifiable to the pilot without reliance on the EVS:~~

~~(i) the lights or markings of the threshold; or~~

~~(ii) the lights or markings of the touchdown zone.~~

~~(f) Approach operations utilising EVS – APV and NPA operations flown with the CDFA technique~~

~~(1) At DH/MDH, visual references should be displayed and identifiable to the pilot on the EVS image as specified under (a).~~

~~(2) At 200 ft above runway threshold elevation, at least one of the visual references specified under (a) should be distinctly visible and identifiable to the pilot without reliance on the EVS.~~

The following AMC1 SPO.OP.215(b) is inserted:

AMC1 SPO.OP.215(b) Commencement and continuation of approach

MINIMUM RVR FOR CONTINUATION OF APPROACH — HELICOPTERS

(a) The controlling RVR should be the touchdown RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

The following GM1 SPO.OP.215 is inserted:

GM1 SPO.OP.215 Commencement and continuation of approach

APPLICATION OF RVR OR VIS REPORTS — AEROPLANES

(a) There is no prohibition on the commencement of an approach based on the reported RVR or VIS. The restriction in SPO.OP.215 applies only if the RVR or VIS is reported and applies to the continuation of the approach past a point where the aircraft is 1000 ft above the aerodrome elevation or in the FAS, as applicable.

APPLICATION OF RVR OR VIS REPORTS — HELICOPTERS

(b) There is no prohibition on the commencement of an approach based on the reported RVR. The restriction in SPO.OP.215 applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or into the FAS, as applicable.

The prohibition to continue the approach applies only if the RVR is reported and is below 550m and is below the operating minima. There is no prohibition based on VIS.

(c) If the reported RVR is 550 m or greater, but it is less than the RVR calculated in accordance with AMC5 CAT.OP.MPA.110, a go-around is likely to be necessary since visual reference may not be established at the DH or MDH. Similarly, in the absence of an RVR report, the reported visibility or a digital image may indicate that a go-around is likely. The pilot-in-command should consider available options, based on a thorough assessment of risk, such as diverting to an alternate, before commencing the approach.

APPLICATION OF RVR OR VIS REPORTS — ALL AIRCRAFT

(d) If a deterioration in the RVR or VIS is reported once the aircraft is below 1 000 ft or in the FAS, as applicable, then there is no requirement for the approach to be discontinued. In this situation, the normal visual reference requirements would apply at the DA/H.

(e) Where additional RVR information is provided (e.g. midpoint and stop end), this is advisory; such information may be useful to the pilot in order to determine whether there will be sufficient visual reference to control the aircraft during roll-out and taxi. For operations where the aircraft will be controlled manually during roll-out, Table 1 in AMC1 SPA.LVO.100(a) provides an indication of the RVR that may be required to allow manual lateral control of the aircraft on the runway.

The following AMC1 SPO.OP.215(c) is inserted:

AMC1 SPO.OP.215(c) Commencement and continuation of approach

VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS

For instrument approach operations Type A and CAT I instrument approach operations Type B, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot at the MDA/H or the DA/H:

(a) elements of the approach lighting system;

(b) the threshold;

(c) the threshold markings;

(d) the threshold lights;

(e) the threshold identification lights;

(f) the visual glide path indicator;

(g) the TDZ or TDZ markings;

(h) the TDZ lights;

(i) FATO/runway edge lights;

(j) for helicopter PinS approaches, the identification beacon light and visual ground reference;

(k) for helicopter PinS approaches, the identifiable elements of the environment defined on the instrument chart;

(l) for helicopter PinS approaches with instructions to 'proceed VFR', sufficient visual cues to determine that VFR criteria are met; or

(m) other visual references specified in the operations manual.

The following GM1 SPO.OP.215(f) is inserted:

GM1 SPO.OP.215(f) Commencement and continuation of approach

APPROACHES WITH NO INTENTION TO LAND

The approach may be continued to the DA/H or the MDA/H regardless of the reported RVR or VIS. Such operations should be coordinated with the air traffic services (ATS).

AMC2 SPO.OP.230 is replaced by the following:

AMC2 SPO.OP.230 Standard operating procedures

TEMPLATE

[…]

(c) Crew members:

[…]

(2) In addition, for flight crew members, the following should be specified:

(i) selection criteria (initial qualification, flight experience, experience of the activity);

(ii) initial training (volume and content of the training); and

(iii) recent experience requirement and/or recurrent training (volume and content of the training).

(3) If the operator specifies a crew composition of more than one pilot, the following should apply:

(i) the SOPs should ensure that the pilot flying and pilot monitoring functions are possible from either pilot's seat throughout the flight; and

(ii) the operator should adapt the SOPs to the specified crew composition.

The criteria listed in (c)(2)(i) to (c)(2)(iii) should take into account the operational environment and the complexity of the activity and should be detailed in the training programmes.

[…]

The following GM1 SPO.OP.235 is inserted:

GM1 SPO.OP.235 EFVS 200 operations

GENERAL

(a) EFVS operations exploit the improved visibility provided by the EFVS to extend the visual segment of an instrument approach. EFVSs cannot be used to extend the instrument segment of an approach and thus the DH for EFVS 200 operations is always the same as for the same approach conducted without EFVS.

(b) Equipment for EFVS 200 operations

(1) In order to conduct EFVS 200 operations, a certified EFVS is used (EFVS-A or EFVS-L). An EFVS is an enhanced vision system (EVS) that also incorporates a flight guidance system and displays the image on a HUD or equivalent display. The flight guidance system will incorporate aircraft flight information and flight symbology.

(2) In multi-pilot operations, a suitable display of EFVS sensory imagery is provided to the pilot monitoring.

(c) Suitable approach procedures

(1) Types of approach operation are specified in AMC1 SPO.OP.235(a)(2).

EFVS 200 operations are used for 3D approach operations. This may include operations based on NPA procedures, approach procedures with vertical guidance and PA procedures including approach operations requiring specific approvals, provided that the operator holds the necessary approvals.

(2) Offset approaches

Refer to AMC1 SPO.OP.235(a)(2).

(3) Circling approaches

EFVSs incorporate a HUD or an equivalent system so that the EFVS image of the scene ahead of the aircraft is visible in the pilot's forward external FOV. Circling operations require the pilot to maintain visual references that may not be directly ahead of the aircraft and may not be aligned with the current flight path. EFVSs cannot therefore be used in place of natural visual reference for circling approaches.

(d) Aerodrome operating minima for EFVS 200 operations are determined in accordance with AMC1 SPO.OP.235(a)(8).

The performance of EFVSs depends on the technology used and weather conditions encountered. Table 1 'Operations utilising EFVS: RVR reduction' has been developed after an operational evaluation of two different EVSs, both using infrared sensors, along with data and support provided by the FAA. Approaches were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. Table 1 contains conservative figures to cater for the expected performance of infrared sensors in the variety of conditions that might be encountered. Some systems may have better capability than those used for the evaluation, but credit cannot be taken for such performance in EFVS 200 operations.

(e) The conditions for commencement and continuation of the approach are in accordance with SPO.OP.215.

Pilots conducting EFVS 200 operations may commence an approach and continue that approach below 1 000 ft above the aerodrome or into the FAS if the reported RVR or CMV is equal to or greater than the lowest RVR minima determined in accordance with AMC1 SPO.OP.235(a)(8) and if all the conditions for the conduct of EFVS 200 operations are met.

Should any equipment required for EFVS 200 operations be unserviceable or unavailable, the conditions to conduct EFVS 200 operations would not be satisfied, and the approach should not be commenced. In the event of failure of the equipment required for EFVS 200 operations after the aircraft descends below 1 000 ft above the aerodrome or into the FAS, the conditions of SPO.OP.230 would no longer be satisfied unless the RVR reported prior to commencement of the approach was sufficient for the approach to be flown without the use of EFVS in lieu of natural vision.

(f) EFVS image requirements at the DA/H are specified in AMC1 SPO.OP.235(a)(4).

The requirements for features to be identifiable on the EFVS image in order to continue approach below the DH are more stringent than the visual reference requirements for the same approach flown without EFVS. The more stringent standard is needed because the EFVS might not display the colour of lights used to identify specific portions of the runway and might not consistently display the runway markings. Any visual approach path indicator using colour-coded lights may be unusable.

(g) Obstacle clearance in the visual segment

The 'visual segment' is the portion of the approach between the DH or the MAPt and the runway threshold. In the case of EFVS 200 operations, this part of the approach may be flown using the EFVS image as the primary reference and obstacles may not always be identifiable on an EFVS image. The operational assessment specified in AMC1 SPO.OP.235(a)(2) is therefore required to ensure obstacle clearance during the visual segment.

(h) Visual reference requirements at 200 ft above the threshold

For EFVS 200 operations, natural visual reference is required by a height of 200 ft above the runway threshold. The objective of this requirement is to ensure that the pilot will have sufficient visual reference to land. The visual reference should be the same as that required for the same approach flown without the use of EFVS.

Some EFVSs may have additional requirements that have to be fulfilled at this height to allow the approach to continue, such as a requirement to check that elements of the EFVS display remain correctly aligned and scaled to the external view. Any such requirements will be detailed in the AFM and included in the operator's procedures.

(i) Specific approval for EFVS

In order to use EFVS without natural visual reference below 200 ft above the threshold, the operator needs to hold a specific approval in accordance with Part-SPA.

(j) Go-around

A go-around will be promptly executed if the required visual references are not maintained on the EFVS image at any time after the aircraft has descended below the DA/H or if the required visual references are not distinctly visible and identifiable using natural vision after the aircraft is below 200 ft. It is considered more likely that an EFVS 200 operation could result in the initiation of a go-around below the DA/H than the equivalent approach flown without EFVS and thus the operational assessment required by AMC1 SPO.OP.235(a)(2) takes into account the possibility of a balked landing.

An obstacle free zone (OFZ) may also be provided for CAT I PA procedures. Where an OFZ is not provided for a CAT I precision approach, this will be indicated on the approach chart. NPA procedures and approach procedures with vertical guidance provide obstacle clearance for the missed approach based on the assumption that a go-around is executed at the MAPt and not below the MDH.

The following AMC1 SPO.OP.235(a) is inserted:

AMC1 SPO.OP.235(a)(1) EFVS 200 operations

EQUIPMENT CERTIFICATION

For EFVS 200 operations, the aircraft should be equipped with an approach system using EFVS-A or a landing system using EFVS-L.

The following AMC1 SPO.OP.235(a)(2) is inserted:

AMC1 SPO.OP.235(a)(2) EFVS 200 operations

AERODROMES AND INSTRUMENT PROCEDURES SUITABLE FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the operator should verify the suitability of a runway before authorising EFVS operations to that runway through an operational assessment taking into account the following elements:

(1) the obstacle situation;

(2) the type of aerodrome lighting;

(3) the available IAPs;

(4) the aerodrome operating minima; and

(5) any non-standard conditions that may affect the operations.

(b) EFVS 200 operations should only be conducted as 3D operations, using an IAP in which the final approach track is offset by a maximum of 3 degrees from the extended centre line of the runway.

(c) The IAP should be designed in accordance with PANS-OPS, Volume I (ICAO Doc 8168) or equivalent criteria.

The following AMC2 SPO.OP.235(a)(2) is inserted:

AMC2 SPO.OP.235(a)(2) EFVS 200 operations

VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS 200 OPERATIONS

The operational assessment before authorising the use of a runway for EFVS 200 operations may be conducted as follows:

(a) Check whether the runway has been promulgated as suitable for EFVS 200 operations or is certified as a PA category II or III runway by the State of the aerodrome. If this is so, then check whether and where the approach and runway lights installed (notably incandescent or LED lights) are adequate for the EFVS equipment used by the operator.

(b) If the check in point (a) above comes out negative (the runway is not promulgated as EFVS suitable or is not category II or III), then proceed as follows:

(1) For straight-in IAPs, US Standard for Terminal Instrument Procedures (TERPS) may be considered to be acceptable as an equivalent to PANS-OPS. If other design criteria than PANS-OPS or US TERPS are used, the operations should not be conducted.

(2) If an OFZ is established, this will ensure adequate obstacle protection from 960 m before the threshold. If an OFZ is not established or if the DH for the approach is above 250 ft, then check whether there is a visual segment surface (VSS).

(3) VSSs are required for procedures published after 15 March 2007, but the existence of the VSS has to be verified through an aeronautical information publication (AIP), operations manual Part C, or direct contact with the aerodrome. Where the VSS is established, it may not be penetrated by obstacles. If the VSS is not established or is penetrated by obstacles and an OFZ is not established, then the operations should not be conducted. Note: obstacles of a height of less than 50 ft above the threshold may be disregarded when assessing the VSS.

(4) Runways with obstacles that require visual identification and avoidance should not be accepted.

(5) For the obstacle protection of a balked landing where an OFZ is not established, the operator may develop an alternative lateral profile to be followed in the event of a go-around below the DA/H;

(6) Perform an assessment of the suitability of the runway which should include whether the approach and runway lights installed (notably incandescent or LED lights) are adequate for the EFVS equipment used by the operator.

(c) If the AFM stipulates specific requirements for approach procedures, then the operational assessment should verify that these requirements can be met.

The following AMC1 SPO.OP.235(a)(3) is inserted:

AMC1 SPO.OP.235(a)(3) EFVS 200 operations

INITIAL TRAINING FOR EFVS 200 OPERATIONS

Operators should ensure that flight crew members complete the following conversion training before being authorised to conduct EFVS operations unless credits related to training and checking for previous experience on similar aircraft types are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012:

(a) A course of ground training including at least the following:

(1) characteristics and limitations of head-up displays (HUDs) or equivalent display systems including information presentation and symbology;

(2) EFVS sensor performance in different weather conditions, sensor limitations, scene interpretation, visual anomalies and other visual effects;

(3) EFVS display, control, modes, features, symbology, annunciations and associated systems and components;

(4) the interpretation of EFVS imagery;

(5) the interpretation of approach and runway lighting systems and display characteristics when using EFVS;

(6) pre-flight planning and selection of suitable aerodromes and approach procedures;

(7) principles of obstacle clearance requirements;

(8) the use and limitations of RVR assessment systems;

(9) normal, abnormal and emergency procedures for EFVS 200 operations;

(10) the effect of specific aircraft/system malfunctions;

(11) human factors aspects of EFVS 200 operations; and

(12) qualification requirements for pilots to obtain and retain approval for EFVS 200 operations.

(b) A course of FSTD training and/or flight training in two phases as follows:

(1) Phase one (EFVS 200 operations with aircraft and all equipment serviceable) — objectives:

(i) understand the operation of equipment required for EFVS 200 operations;

(ii) understand operating limitations of the installed EFVS;

(iii) practice the use of HUD or equivalent display systems;

(iv) practice the set-up and adjustment of EFVS equipment in different conditions (e.g. day and night);

(v) practice the monitoring of automatic flight control systems, EFVS information and status annunciators;

(vi) practice the interpretation of EFVS imagery;

(vii) become familiar with the features needed on the EFVS image to continue approach below the DH;

(viii) practice the identification of visual references using natural vision while using EFVS equipment;

(ix) master the manual aircraft handling relevant to EFVS 200 operations including, where appropriate, the use of the flare cue and guidance for landing;

(x) practice coordination with other crew members; and

(xi) become proficient at procedures for EFVS 200 operations.

(2) Phase one of the training should include the following exercises:

(i) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

(ii) the use of HUD or equivalent display systems during all phases of flight;

(iii) approach using the EFVSs installed on the aircraft to the appropriate DH and transition to visual flight and landing;

(iv) approach with all engines operating using the EFVS, down to the appropriate DH followed by a missed approach, all without external visual reference, as appropriate.

(3) Phase two (EFVS 200 operations with aircraft and equipment failures and degradations) — objectives:

(i) understand the effect of known aircraft unserviceabilities including use of the MEL;

(ii) understand the effect of failed or downgraded equipment on aerodrome operating minima;

(iii) understand the actions required in response to failures and changes in the status of the EFVS including HUD or equivalent display systems;

(iv) understand the actions required in response to failures above and below the DH;

(v) practice abnormal operations and incapacitation procedures; and

(vi) become proficient at dealing with failures and abnormal situations during EFVS 200 operations.

(4) Phase two of the training should include the following exercises:

(i) approaches with engine failures at various stages of the approach;

(ii) approaches with failures of the EFVS at various stages of the approach, including failures between the DH and the height below which an approach should not be continued if natural visual reference is not acquired, require either:

(A) reversion to head down displays to control missed approach; or

(B) reversion to flight with downgraded or no guidance to control missed approaches from the DH or below, including those which may result in a touchdown on the runway;

(iii) incapacitation procedures appropriate to EFVS 200 operations;

(iv) failures and procedures applicable to the specific EFVS installation and aircraft type; and

(v) FSTD training, which should include minimum eight approaches.

The following AMC2 SPO.OP.235(a)(3) is inserted:

AMC2 SPO.OP.235(a)(3) EFVS 200 operations

RECURRENT TRAINING AND CHECKING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the pilots are competent to perform EFVS 200 operations. To do so, pilots should be trained every 6 months by performing at least two approaches on each type of aircraft operated.

(b) The operator should ensure that the pilots' competence to perform EFVS 200 operations is checked at each required operator proficiency check by performing at least two approaches on each type of aircraft operated, of which one should be flown without natural vision to 200 ft.

The following AMC3 SPO.OP.235(a)(3) is inserted:

AMC3 SPO.OP.235(a)3) EFVS 200 operations

RECENT EXPERIENCE REQUIREMENTS FOR EFVS 200 OPERATIONS

Pilots should complete a minimum of four approaches using the operator's procedures for EFVS 200 operations during the validity period of the periodic operator proficiency check unless credits related to currency are defined in the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

The following AMC4 SPO.OP.235(a)(3) is inserted:

AMC4 SPO.OP.235(a)(3) EFVS 200 operations

DIFFERENCES TRAINING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the flight crew members authorised to conduct EFVS 200 operations are provided with differences training or familiarisation whenever there is a change to any of the following:

(1) the technology used in the flight guidance and flight control system;

(2) the HUD or equivalent display systems;

(3) the operating procedures.

(b) The differences training should:

(1) meet the objectives of the appropriate initial training course;

(2) take into account the flight crew members' previous experience; and

(3) take into account the operational suitability data established in accordance with UK Regulation (EU) No 748/2012.

The following AMC5 SPO.OP.235(a)(3) is inserted:

AMC5 SPO.OP.235(a)(3) EFVS 200 operations

TRAINING FOR EFVS 200 OPERATIONS

If a flight crew member is to be authorised to operate as pilot flying and pilot monitoring during EFVS 200 operations, then the flight crew member should complete the required FSTD training for each operating capacity.

The following GM1 SPO.OP.235(a)(3) is inserted:

GM1 SPO.OP.235(a)(3) EFVS 200 operations

RECURRENT CHECKING FOR EFVS 200 OPERATIONS

In order to provide the opportunity to practice decision-making in the event of system failures and failure to acquire natural visual reference, the recurrent training and checking for EFVS 200 operations is recommended to periodically include different combinations of equipment failures, go-around due to loss of visual reference, and landings.

The following AMC1 SPO.OP.235(a)(4) is inserted:

AMC1 SPO.OP.235(a)(4) EFVS 200 operations

OPERATING PROCEDURES FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the following should apply:

- (1) the pilot flying should use the EFVS throughout the approach;
- (2) in multi-pilot operations, a suitable display of EFVS sensory imagery should be provided to the pilot monitoring;
- (3) the approach between the FAF and the DA/H should be flown using vertical flight path guidance;
- (4) the approach may be continued below the DA/H provided that the pilot can identify on the EFVS image either:
  - (i) the approach light system; or
  - (ii) both of the following:
    - (A) the runway threshold identified by the beginning of the runway landing surface, the threshold lights or the runway end identifier lights; and
    - (B) the TDZ identified by the TDZ lights, the TDZ runway markings or the runway lights;
- (5) a missed approach should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by 200 ft above the threshold.

(b) Operating procedures for EFVS 200 operations should:

- (1) be consistent with the AFM;
- (2) be appropriate to the technology and equipment to be used;

(3) specify the duties and responsibilities of each flight crew member in each relevant phase of flight;

(4) ensure that flight crew workload is managed to facilitate effective decision-making and monitoring of the aircraft; and

(5) deviate to the minimum extent practicable from normal procedures used for routine operations.

(c) Operating procedures should include:

(1) the required checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;

(2) the correct seating and eye position;

(3) determination of aerodrome operating minima;

(4) the required visual references at the DH;

(5) the action to be taken if natural visual reference is not acquired by 200 ft;

(6) the action to be taken in the event of loss of the required visual reference; and

(7) procedures for balked landing.

(d) Operating procedures for EFVS 200 operations should be included in the operations manual.

The following AMC1 SPO.OP.235(a)(8) is inserted:

AMC1 SPO.OP.235(a)(8) EFVS 200 operations

AERODROME OPERATING MINIMA — EFVS 200 OPERATIONS

When conducting EFVS 200 operations:

(a) the DA/H used should be the same as for operations without EFVS;

(b) the lowest RVR minima to be used should be determined by reducing the RVR presented in:

(1) Table 8 in AMC5 SPO.OP.110 in accordance with Table 1 below for aeroplanes;

(2) Table 12 of AMC6 SPO.OP.110 in accordance with Table 1 below for helicopters;

(c) in case of failed or downgraded equipment, Table 15 in AMC9 SPO.OP.110 should apply.

Table 1

Operations utilising EFVS: RVR reduction

RVR (m) presented in Table 8 in AMC5 SPO.OP.110 or in Table 12 of AMC6 SPO.OP.110	RVR (m) for EFVS 200 operations
550	550
600	550
650	550
700	550
750	550

RVR (m) presented in Table 8 in AMC5 SPO.OP.110 or in Table 12 of AMC6 SPO.OP.110	RVR (m) for EFVS 200 operations
800	550
900	600
1 000	650
1 100	750
1 200	800
1 300	900
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2400	1 600

The following AMC1 SPO.OP.235(c) is inserted:

AMC1 SPO.OP.235(c) EFVS 200 operations

EVFS 200 WITH LEGACY SYSTEMS UNDER AN APPROVAL

The EVS should be certified before 1 January 2022 as 'EVS with an operational credit'.

The following GM1 SPO.OP.235(c) is inserted:

GM1 SPO.OP.235(c) EFVS 200 operations

The CAA referred to in SPO.OP.235 point (c) is the competent authority for the oversight of the operator, as established in ORO.GEN.105.

The following AMC1 SPO.IDE.H.120(d)

AMC1 SPO.IDE.H.120(d) Operations under VFR – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots should be considered to be required by the operation if multi-pilot operations are required by one of the following:

(a) the AFM;

(b) at night, the operations manual.

The following GM1 SPO.IDE.H.120(d) is inserted:

GM1 SPO.IDE.H.120(d) Operations under VFR – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS ON A VOLUNTARY BASIS — HELICOPTERS OPERATED BY DAY UNDER VFR

If the AFM permits single-pilot operations, and the operator decides that the crew composition is more than one pilot for day VFR operations only, then point SPO.IDE.H.120(d) does not apply. Additional displays, including those referred to in SPO.IDE.H.120(d), may be required under point SPO.IDE.H.100(e).

The following AMC1 SPO.IDE.H.125(c) is inserted:

AMC1 SPO.IDE.H.125(c) Operations under IFR – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots should be considered to be required by the operation if multi-pilot operations are required by one of the following:

(a) the AFM;

(b) the operations manual.