Appendix to Opinion No 02/2020

Draft Acceptable Means of Compliance (AMC) and Guidance Material (GM)
to Annexes I-VIII to Commission Regulation (EU) No 965/2012

(RMT.0573)

The draft AMC and GM to Annexes I-VIII to Commission Regulation (EU) No 965/2012 are amended as follows:

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

(a) deleted text is marked with ~~strike-through~~;

(b) new or amended text is highlighted in blue;

(c) an ellipsis '(…)' indicates that the rest of the text is unchanged.

GM2 Annex I Definitions

ABBREVIATIONS AND ACRONYMS

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

(…)

LED	light-emitting diode
LHO	local helicopter operation
LHS	left hand seat

(…)

GM27 Annex I Definitions

FUEL/ENERGY ERA AERODROME

Fuel ERA aerodromes could be used in the following cases:

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

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

(c) 'Fuel ERA aerodrome PNR': this aerodrome is used at the PNR during isolated-aerodrome operations.

GM28 Annex I Definitions

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 after brakes' failure, obstruction or closure of the runway, runway contamination, failure or malfunction caused by on-ground navigation or approach equipment);

(4) navigational 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 ERA, 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 PNR due to e.g. 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.

GM29 Annex I Definitions

FUEL/ENERGY

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 classical 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 propulsion purposes.

The term ‘fuel/energy’ should cater for both classical 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).

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 competent authority should be satisfied that the operator fulfils the applicable criteria of 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 competent authority should be satisfied that the operator fulfils the applicable criteria of 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 schemes that deviates, fully or in part, from the basic fuel scheme, the competent authority should be satisfied that the operator fulfils the applicable criteria of 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 competent authority should verify:

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

(2) the adequacy of this 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 for flight crew and operational-control personnel;

(9) the experience of the relevant personnel, 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 measurements systems.

GM1 ARO.OPS.225 Approval of fuel/energy schemes~~operations to an isolated aerodrome~~

OPERATIONS TO AN ISOLATED AERODROME — GENERAL

The use of an isolated aerodrome exposes the aircraft and passengers to a greater risk than ~~to~~ 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 competent authority should therefore assess whether all possible means are applied to mitigate the greater risk.

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

ASSESSMENT AND OVERSIGHT OF POLICIES ASSOCIATED WITH FUEL SCHEMES

The competent authority's assessment and oversight of the:

— fuel planning and in-flight replanning policy;

— selection of aerodromes policy; and

— 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 competent authority should be satisfied of:

— 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.

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

APPROVAL OF INDIVIDUAL FUEL SCHEMES — QUALIFICATION OF STAFF

(a) In accordance with point ARO.GEN.200 (a)(2), the competent authority needs to have qualified staff to perform the tasks under its responsibility. To approve individual fuel schemes, the competent authority'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 competent authority should develop guidance to be used by its inspectors when approving and verifying individual fuel schemes.

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

APPROVAL OF INDIVIDUAL FUEL SCHEMES — APPLICATION OF INDIVIDUAL FUEL SCHEMES — GUIDANCE TO STAFF

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

(a) operator's responsibilities:

(1) operational-control systems (organisation control over internal processes);

(2) policies and procedures;

(3) qualified personnel:

(i) competence and experience of flight crew and personnel; and

(ii) their training;

(4) compliance and suitability of SOPs;

(5) monitoring of 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 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 competent authority inspectors should consider the specificity of operation 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).

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 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.).

GM1 ORO.GEN.110(c) Operator responsibilities

OPERATIONAL CONTROL

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

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

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

INSTRUCTIONS, DEMONSTRATION, AND AWARENESS OF THE RESPONSABILITIES OF PERSONNEL — FLIGHT OPERATIONS OFFICERS/FLIGHT DISPATCHERS, PERFORMING TASKS RELATED TO FLIGHT MONITORING AND FLIGHT WATCH — TRAINING PROGRAMME

(a) When an operator uses flight monitoring and flight watch as functions of a system for exercising operational control, the operator should develop a training programme, based on the relevant parts of ICAO Annex 1 and Doc 10106, for the flight operations officers (FOOs)/ flight dispatchers (FDs), performing those functions.

(b) The training programme specified in point (a) should be detailed in the OM of the operator and should be delivered by a ground instructor.

INITIAL TRAINING

(c) 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:

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

(B) operating limitations of aeroplanes and engines; and

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

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

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

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

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

(D) 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 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

(d) In addition to the initial training, flight operations officers should receive training on the specific duties, responsibilities, and tools that are associated with the operational control system of the operator.

RECURRENT TRAINING

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

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

KNOWLEDGE, SKILLS, AND QUALIFICATIONS OF GROUND INSTRUCTORS

(g) Unless otherwise required by the appropriate national regulations, instructors 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 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.

(h) The operator should include in the OM the required knowledge, skills, and qualifications of the FOO/FD ground instructors.

AMC2 ORO.GEN.110(f) Operator responsibilities

INSTRUCTIONS AND AWARENESS OF THE RESPONSABILITIES 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, a flight operations officer (FOO)/flight dispatcher (FD), before assuming duties, should receive a briefing on the elements related to the safety of the operations the FOO/FD will exercise as part of the operational control.

GM2 ORO.GEN.110(f) Operator responsibilities

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

In the context of AMC2 ORO.GEN.110(f), before commencing shift, the flight operations officer (FOO)/flight dispatcher (FD) should be briefed on relevant safety information such as:

(a) weather charts;

(b) weather reports;

(c) NOTAM;

(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

(f) other relevant safety information as listed in GM 20 Annex I Definitions.

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 competent authority as specified in the applicable Implementing Rules:

(a) alternative means of compliance;

(…)

(i) ~~fuel policy~~ fuel schemes and special refuelling or defueling 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 of Annex V (SPA.HEMS);

(2) to/from a public interest site;

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

(4) during refuelling with rotors turning;

(…)

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 OPERATIONS MANUAL

0.1 Introduction:

(…)

8 OPERATING PROCEDURES

8.1 Flight preparation instructions. As applicable to the operation:

(…)

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 auxiliary power unit of an aircraft 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~~;

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 MET.TR.215 (a) of Annex V (Part-MET) to Regulation (EU) 2017/373, and comprise the following:

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

(b) supplementary meteorological information other than that specified in point (a), which should be based on data from certified meteorological service providers or other reliable sources that are evaluated by the operator.

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

RELIABLE SOURCES OF METEOROLOGICAL INFORMATION

In the context of point (b) of AMC1 CAT.GEN.MPA.180(a)(18), reliable sources of meteorological information are the organisations that are evaluated by an operator as being able to provide an appropriate level of data assurance in terms of accuracy and integrity. The operator may consider the following aspects in the evaluation:

(a) The organisation should have in place a quality assurance system that covers source selection, acquisition/import, processing, validity period check, and distribution phase of data.

(b) Any meteorological product that is provided by the organisation within the scope of the meteorological information included in the flight documentation defined in point MET.TR.215 (e) of Part-MET should originate only from authoritative sources or certified providers, and should not be transformed or altered, except for the purpose of presenting the data in the correct format. The organisation's process should provide assurance that the integrity of such products is preserved in the data to be used by flight crew and operators, regardless of their form.

GM1 CAT.OP.MPA.107 Adequate aerodrome

VERIFICATION OF WEATHER CONDITIONS

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') and point CAT.OP.MPA.107 of Annex IV (Part-CAT) to Regulation (EU) No 965/2012; and

— 'weather-permissible aerodrome' means an adequate aerodrome with additional requirements: see definition in 'Definitions'.

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

~~**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.~~

AMC1 CAT.OP.MPA.150(b), AMC2 CAT.OP.MPA.150(b), AMC3 CAT.OP.MPA.150(b), GM1 CAT.OP.MPA.150(b), GM1 CAT.OP.MPA.150(c)(3)(i), and GM1 CAT.OP.MPA.150(c)(3)(ii) are deleted.

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;

(…)

(13) planned cruising speed and flying times between check-points/waypoints (estimated, revised, and actual times overhead);

(…)

(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 or aerodromes;

~~(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 MET.OR.240 of Annex V (Part-MET) to Regulation (EU) 2017/373.

(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.

(…)

(e) For helicopters with a crew of one pilot and not equipped with a stabilisation system, entries should be made only in the flight preparation phase and not during the flight.

OPERATIONAL FLIGHT PLAN — OTHER-THAN-COMPLEX MOTOR-POWERED AIRCRAFT OPERATIONS AND LOCAL OPERATIONS

(f) 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 AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

(g) No entries in the operational flight plan should be made during the flight.

OPERATIONAL FLIGHT PLAN PRODUCED BY A COMPUTERISED FLIGHT-PLANNING SYSTEM

(h) 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.

(i) 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 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.

AMC1 CAT.OP.MPA.177 Submission of the ATS flight plan

FLIGHTS WITHOUT AN 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 (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.

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 of the following 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 that are agreed with the competent authority; 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 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 competent authority and its continuous oversight, the operator should establish an effective continuous reporting system to the competent authority 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) have a suitable computerised flight planning system;

(2) ensure that the planning of flights is based upon current aircraft-specific data that are 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 communication 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 authority as soon as practicable.

GM1 CAT.OP.MPA.180 Fuel/energy scheme — aeroplanes

FUEL SCHEMES

In the context of CAT.OP.MPA.180, 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 the operator decides to deviate fully or in part 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).

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 competent authority;

(3) difference between planned and actual trip fuel;

(4) landings with less than the final reserve fuel (FRF) remaining;

(5) flights landing with less than minutes of fuel remaining (e.g. 45 minutes), as agreed by the operator and the competent authority;

(6) 'MINIMUM FUEL' declarations;

(7) 'MAYDAY MAYDAY MAYDAY FUEL' declarations;

(8) in-flight replanning 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;

(10) diversion to the destination alternate aerodrome; and

(11) any other indicator with the potential to demonstrate 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 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 EASA Fuel manual provide further guidance.

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).

AMC1 CAT.OP.MPA.181 Fuel/energy schemes — fuel/energy planning and in-flight replanning policy — aeroplanes

BASIC FUEL SCHEME — PREFLIGHT CALCULATION OF USABLE FUEL FOR PERFORMANCE CLASS A AEROPLANES

For the preflight calculation of the usable fuel/energy in accordance with 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 replanning, 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 final reserve fuel, 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.

AMC2 CAT.OP.MPA.181 Fuel/energy schemes — fuel/energy planning and in-flight replanning policy — aeroplanes

BASIC FUEL SCHEME — PREFLIGHT CALCULATION OF USABLE FUEL FOR PERFORMANCE CLASS B AND C AEROPLANES

The preflight 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) final reserve fuel (FRF) to fly for an additional period of 45 minutes with reciprocating engines or 30 minutes with turbine engines;

(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.

AMC3 CAT.OP.MPA.181. Fuel/energy scheme — fuel/energy planning and in-flight replanning policy — aeroplanes

BASIC FUEL SCHEME — PREFLIGHT 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 in the OM. This FRF should not be less than the amount needed to fly for a period of 45 minutes. The operating conditions may be rounded up to a single figure of fuel for all flights. For the preflight 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.

AMC4 CAT.OP.MPA.181. Fuel/energy scheme — Fuel/energy planning and in-flight replanning policy — aeroplanes

BASIC FUEL SCHEME — PREFLIGHT 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.

GM1 CAT.OP.MPA.181 is deleted and replaced by the following:

GM1 CAT.OP.MPA.181 Fuel/energy scheme — fuel/energy planning and in-flight replanning 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 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 replanning.

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 competent authority. 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 programme.

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) final reserve fuel (FRF) 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 preflight fuel planning computations, and for the purpose of a ‘gross error’ check; and

(2) to provide flight crews with easily referenced and recallable FRF 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 airport authority 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 REPLANNING

(l) In the context of fuel policy, in-flight replanning 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 replanning 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 replanning 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 replanning requirements.

In-flight replanning 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.

AMC5 CAT.OP.MPA.181 Fuel/energy scheme — fuel/energy planning and in-flight replanning 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.

AMC6 CAT.OP.MPA.181 Fuel/energy scheme — fuel/energy planning and in-flight replanning 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 programme for individual aeroplanes, and uses valid data for fuel calculation based on such a programme, the operator may use any of the requirements in point (c) or (d) to calculate the contingency fuel.

(c) The contingency fuel should be the fuel described in points (c)(1), (c)(2), (c)(3) or (c)(4), whichever is higher:

(1) 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 a fuel en route alternate (fuel ERA) aerodrome is available; or

(2) an amount of fuel sufficient for 20-minute flying time based upon the planned trip fuel consumption; or

(3) 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

(4) an amount to fly for 5 minutes at holding speed at 1 500 ft (450 m) above the destination aerodrome in standard conditions.

(d) Reduced contingency fuel (RCF) procedure: if the operator's fuel policy includes preflight 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) alternate fuel or no alternate fuel if the decision point is less than 6 hr away from the destination 1 aerodrome and AMC1 CAT.OP.MPA.182 is used;

(v) final reserve fuel (FRF);

(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) final reserve fuel (FRF);

(vi) additional fuel;

(vii) extra fuel if there are anticipated delays or specific operational constraints; and

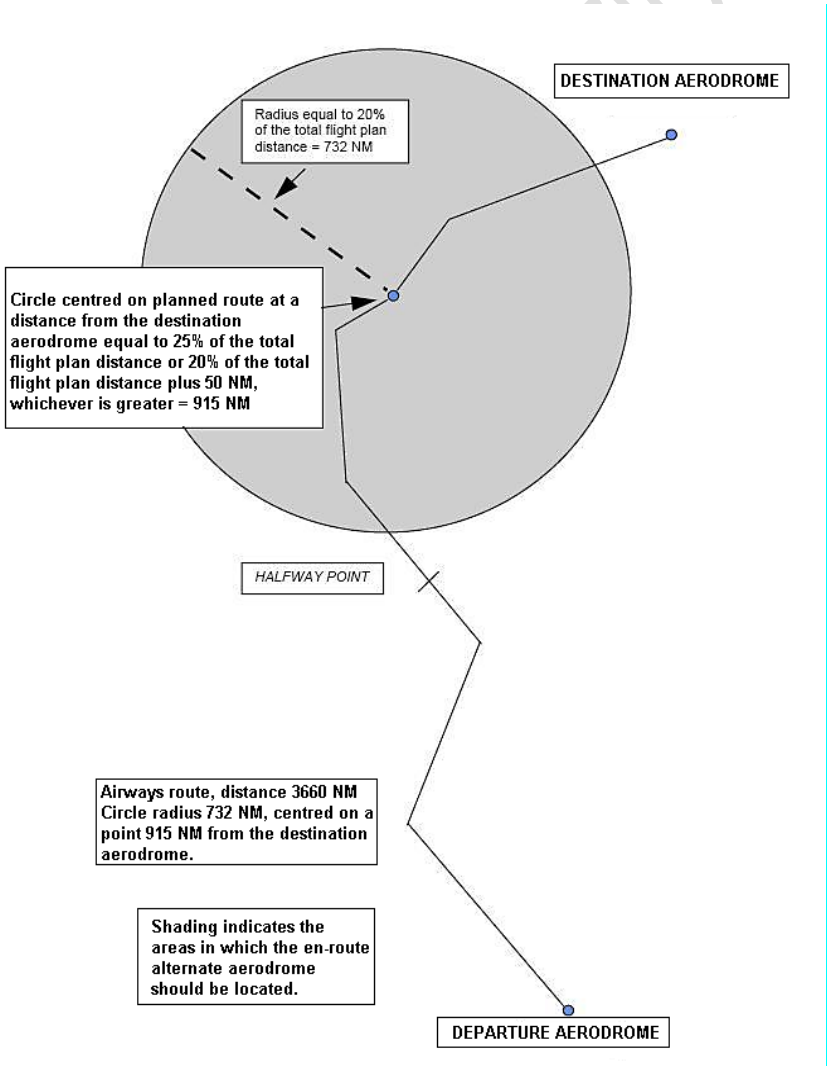
(viii) discretionary fuel, if required by the commander.

AMC7 CAT.OP.MPA.181 Fuel/energy scheme — fuel/energy planning and in-flight replanning 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, and the centre of which 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 %



GM2 CAT.OP.MPA.181 Fuel/energy scheme — fuel/energy planning and in-flight replanning 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 hr or;

(2) more than 2 hr and no fuel ERA aerodrome is available;

(b) 99 % coverage if the calculated flight time is more than 2 hr and a fuel en route alternate (fuel ERA) aerodrome is available; and

(c) 90 % coverage if:

(1) the calculated flight time is more than 2 h;

(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 compliance with point CAT.OP.MPA.182 (e).

AMC8 CAT.OP.MPA.181 Fuel/energy scheme — fuel/energy planning and in-flight replanning policy — aeroplanes

INDIVIDUAL FUEL SCHEME — FUEL CONSUMPTION MONITORING SYSTEM

A fuel consumption monitoring system should be data-driven and include:

(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.

GM3 CAT.OP.MPA.181 Fuel/energy scheme — fuel/energy planning and in-flight replanning 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 competent authority 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.

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-hr flight time at an 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 Regulation (EU) No 965/2012, subject to any minimum equipment list (MEL) restriction, up to a maximum of 2-hr 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-h 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.

AMC2 CAT.OP.MPA.182 Fuel/energy scheme — aerodrome selection policy — aeroplanes

BASIC FUEL SCHEME — 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 or, in the event of in-flight replanning in accordance with point CAT.OP.MPA.181 (d), the remaining flying time to destination does not exceed 6 hr; 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 hr before to 1 hr 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.

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 preflight planning

<table>
<tr><td colspan="8">APPLICATION OF AERODROME FORECASTS (TAF & TREND) TO PREFLIGHT PLANNING</td></tr>
<tr><td colspan="8">(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.</td></tr>
<tr><td colspan="8">(b) APPLICATION OF FORECAST FOLLOWING CHANGE INDICATION IN THE TAF AND TREND</td></tr>
<tr><td rowspan="3"><u>TAF or TREND</u> for AERODROME PLANNED AS:</td><td>FM… (alone) and <u>BECMG AT</u>:</td><td colspan="2">BECMG (alone), BECMG FM, BECMG TL, <u>BECMG FM… TL</u>, in case of:</td><td colspan="3">TEMPO (alone), <u>TEMPO FM</u>, <u>TEMPO FM… TL</u>, <u>PROB 30/40</u> (alone)</td><td><u>PROB TEMPO</u></td></tr>
<tr><td>Deterioration and improvement</td><td>Deterioration</td><td>Improvement</td><td colspan="2">Deterioration</td><td>Improvement</td><td>Deterioration and improvement</td></tr>
<tr><td></td><td></td><td></td><td>Transient/shower conditions
in connection with short-lived weather phenomena, e.g. thunderstorms, showers</td><td>Persistent conditions
in connection with e.g. haze, mist, fog, dust storm/sandstorm, continuous precipitations</td><td>In any case</td><td></td></tr>
<tr><td>DESTINATION
at ESTIMATED TIME OF ARRIVAL (ETA) ± 1 HR

TAKE-OFF</td><td>Applicable from the start of change</td><td>Applicable from the start of change</td><td>Applicable from the end of change</td><td>Not applicable

Mean wind and gusts</td><td>Applicable</td><td>Should be disregarded</td><td>Deterioration may be disregarded.
Improvement should be disregarded including mean</td></tr>
</table>

ALTERNATE at ETA ± 1 HR **DESTINATION ALTERNATE** at ETA ± 1 HR **FUEL ERA** at ETA ± 1 HR	**Mean wind** should be within required limits **Gusts** exceeding limits should be fully applied	**Mean wind** should be within required limits **Gusts** exceeding limits should be fully applied	**Mean wind** should be within required limits **Gusts** exceeding limits should be fully applied	exceeding required limits may be disregarded	**Mean wind** should be within required limits **Gusts** exceeding limits should be fully applied		wind and gusts.
	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**		
ETOPS ERA From earliest ETA to ETA ± 1 HR	**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 limits should be fully applied	**Gusts** exceeding limits should be fully applied	**Gusts** exceeding limits should be fully applied	**Gusts** exceeding limits should be fully applied	**Gusts** exceeding limits 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.

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.

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 hr before and ending 1 hr 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) Any limitations related to OEI operations should be taken into account.

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) a destination alternate aerodrome,

(b) a fuel ERA aerodrome, or

(c) an isolated destination aerodrome,

only when the appropriate weather reports and/or forecasts indicate that during a period commencing 1 hr before and ending 1 hr after the estimated time of arrival at the aerodrome, 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	Aerodrome ceiling	Weather minima RVR/VIS
Type B instrument approach operations	DA/H + 200 ft	RVR/VIS + 800 m
Type A instrument approach operations Circling approach	DA/H or MDA/H + 400 ft	RVR/VIS + 1500 m
Wind limitations are applied taking into account the runway condition (dry, wet, contaminated).		

AMC1 CAT.OP.MPA.182(f) Fuel/energy scheme — aerodrome selection policy — aeroplanes

BASIC FUEL SCHEME — DESTINATION AERODROMES — PBN OPERATIONS

To comply with CAT.OP.MPA.182(f), when the operator intends to use PBN, the operator should 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.

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 implementing rule.

ONE SAFE LANDING OPTION

(b) Point CAT.OP.MPA.182 (a) requires the fuel 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.

TWO SAFE LANDING OPTIONS

(c) 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.

(d) 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.

(e) In the case of an isolated aerodrome, only one safe landing option exists beyond the point of no return, therefore, an exception is set out in point CAT.OP.MPA.182 (d)(2), where the conditions to proceed beyond the point of no return are laid down, and further explained in AMC7 CAT.OP.MPA.182 and point (b) of AMC2 CAT.OP.MPA.185(a).

SAFETY MARGINS

(f) 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(f) Fuel/energy scheme — aerodrome selection policy — aeroplanes

BASIC FUEL SCHEME — DESTINATION AERODROMES — PBN OPERATIONS

(a) In the context of AMC1 CAT.OP.MPA.182(f), the limitation of point CAT.OP.MPA.182 (f) applies only to destination alternate aerodromes in flights that require a destination alternate aerodrome. A take-off or en route alternate (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.

AMC7 CAT.OP.MPA.182 Fuel/energy scheme — aerodrome selection policy — aeroplanes

BASIC FUEL SCHEMES WITH VARIATIONS — ISOLATED AERODROME — POINT OF NO RETURN

(a) Unless destination alternate fuel is carried, the operator should use a destination aerodrome as an isolated aerodrome if the alternate fuel plus the final reserve fuel (FRF) 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 or for 2 hr, whichever is less; or

(2) for turbine-engined aeroplanes, the amount of fuel required to fly for 2 hr with normal cruise consumption above the destination aerodrome, including the FRF.

(b) If the operator's fuel planning policy includes an isolated aerodrome, a point of no return should be determined by a computerised flight planning system and specified in the operational flight plan. The required usable fuel for preflight 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 point of no return;

(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 hr, whichever is less; or

(B) for turbine-engined aeroplanes, the fuel to fly for 2 hr with normal cruise consumption above the destination aerodrome, including the FRF;

(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 point of no return;

(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;

(v) extra fuel if there are anticipated delays or specific operational constraints; and

(vi) discretionary fuel, if required by the commander.

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;

(2) hold an approval for LVO approach operations; and

(3) have established an operational-control system that includes flight monitoring.

(c) Additionally, the operator should select an aerodrome as:

(1) a destination alternate aerodrome,

(2) a fuel ERA aerodrome, or

(3) an 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 3 below.

Table 3 — Basic fuel scheme with variations — planning minima

Destination alternate aerodrome, fuel ERA aerodrome, isolated destination aerodrome

Type of approach	Aerodrome ceiling	Weather minima RVR/VIS
Two or more usable type B instrument approach operations to two separate runways***	DA/H* + 100 ft	RVR** + 300 m
One usable type B instrument approach operations	DA/H + 150 ft	RVR + 450 m
Two or more usable type A instrument approach operations, each based on a separate navigation aid	DA/H or MDA/H* + 200 ft	VIS** + 1 000 m
One usable type A instrument approach operation — circling approach	DA/H or 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: an instrument approach operation is considered usable 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.

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~~

In the context of AMC7 CAT.OP.MPA.182 on isolated aerodromes, normal cruise consumption is the consumption of fuel for 2 hr at the isolated aerodrome. These two hours include 30-minute final reserve fuel, 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).

~~(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.~~

GM3 CAT.OP.MPA.182(d)(2) 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.

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 competent authority on what consists 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 final reserve fuel (FRF); or

(ii) the FRF 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, 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; or

(ii) the FRF, 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.

(c) The use of fuel after flight commencement for objectives other than the ones originally intended during preflight planning should require reanalysis and, if applicable, adjustment of the planned operation.

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 reduced contingency fuel (RCF) procedure is used on a flight to proceed to the destination 1 aerodrome, the commander should ensure that the remaining usable fuel at the decision point is at least the total of the trip fuel from the decision point to the destination 1 aerodrome including:

(1) contingency fuel that is equal to 5 % of the trip fuel from the decision point to the destination 1 aerodrome;

(2) destination 1 aerodrome alternate fuel if a destination 1 alternate aerodrome is required;

(3) additional fuel, if required; and

(4) final reserve fuel (FRF).

(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 point of no return (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.

AMC3 CAT.OP.MPA.185(a) Fuel/energy scheme — in-flight fuel/energy management policy — aeroplanes

INDIVIDUAL FUEL SCHEME — COMMITTING TO LAND AT A SPECIFIC AERODROME

The operator should provide relevant safety information to the commander before the commander decides to commit to land at a specific aerodrome.

GM1 CAT.OP.MPA.185 Fuel/energy scheme — in-flight fuel/energy management policy — aeroplanes

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 operator does not need to record 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 final reserve fuel (FRF). 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, even after receiving clearance from ATC. A change that may cause a delay to land 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, 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 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, the 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.

(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. 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.

(i) **Example 3**: the aircraft reaches FL 350, which is the cruising flight level on its 5-hr 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 replanning is done without the destination alternate aerodrome (the destination aerodrome has two runways and good weather, and it is less than 6-hr 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 plus 15-minute flight time. During the next 3,5 hr, an en route alternate (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 EASA Fuel manual.

ENSURING A SAFE LANDING — FINAL RESERVE FUEL PROTECTION

(k) The objective of the FRF 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. When this estimation indicates that the FRF 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 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 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 EASA Fuel manual provide guidance on procedures for in-flight fuel management including reanalysis, adjustment, and/or replanning considerations when a flight begins to consume contingency fuel before take-off.

GM2 CAT.OP.MPA.185, **GM1 CAT.OP.MPA.186**, and **AMC1 CAT.OP.MPA.190** are deleted.

AMC1 CAT.OP.MPA.191(b)&(c) Fuel/energy scheme — fuel/energy planning and in-flight replanning policy —helicopters

PLANNING CRITERIA

(a) The preflight 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 aerodrome 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)-(v);

(5) final reserve fuel (FRF);

(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 preflight 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 preflight 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;

(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) FRF;

(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 preflight 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 hr at holding speed, including FRF; and

(5) extra fuel at the 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.

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 hr before and ending 1 hr 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 hr before to 2 hr after the estimated time of arrival, or from the actual time of departure to 2 hr 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 3000 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 or the destination aerodrome is isolated, and the appropriate weather reports and/or forecasts indicate that during a period commencing 1 hr before and ending 1 hr 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, there is a reasonable probability of landing at destination; or

(5) two destination alternate aerodromes are selected.

(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 point of no return (PNR) should be determined.

PLANNING MINIMA FOR DESTINATION ALTERNATE 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 hr before and ending 1 hr 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 from points (a)(3) or (a)(5), the planning minima for the destination alternate aerodrome(s) are as shown in Table 1:

Table 1 — Planning minima for a destination alternate 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 from 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 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 DESTINATION

(e) To assess the probability of landing at destination, the operator should use supplementary meteorological information when flying under IFR to heliports/operating sites without the meteorological information from a certified service provider, or the operator should select two destination alternates. Such meteorological information is usually available at aerodromes. In Europe, certification of service providers is based on Annex V (Part-MET) to Regulation (EU) 2017/373. In addition, all of 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 operations manual 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) supplementary 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 supplementary 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 destination only if the flight time to the destination and then to the alternate aerodrome is less than 3 hr, and if according to the assessment described in point (e)(3), during a period commencing 1 hr before and ending 1 hr 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 supplementary 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 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.

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 hr before and ending 1 hr 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 of type A. Any limitations related to OEI operations should be also taken into account.

GM1 CAT.OP.MPA.192(c)&(d) Selection of aerodromes and operating sites — helicopters

APPROPRIATE METEOROLOGICAL INFORMATION

(a) Meteorological data conforms to ICAO Annex 3 and Annex V (Part-MET) to 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 competent authority of the meteorological services 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 not less than 9 hr, and not more than 30 hr. 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-hr 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.

GM2 CAT.OP.MPA.192(c)&(d) Selection of aerodromes and operating sites — helicopters

SUPPLEMENTARY METEOROLOGICAL INFORMATION USING DIGITAL IMAGERY

(a) One or more digital images from a digital camera may be considered as supplementary 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) above. 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 supplementary meteorological information should only be valid in the immediate vicinity of the camera.

AMC1 CAT.OP.MPA.192(d) Selection of aerodromes and operating sites — helicopters

DESTINATION AND DESTINATION ALTERNATE AERODROMES — PBN OPERATIONS

To comply with CAT.OP.MPA.192 (d), when the operator intends to use PBN, the operator should 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.

GM1 CAT.OP.MPA.192(d) Selection of aerodromes and operating sites — helicopters

DESTINATION AND DESTINATION ALTERNATE AERODROMES — PBN OPERATIONS

(a) In the context of AMC1 CAT.OP.MPA.192(d), the limitation of point CAT.OP.MPA.182 (f) applies only to destination alternate aerodromes in flights that require a destination alternate aerodrome. A take-off or en route alternate (EAR) 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.

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 final reserve fuel (FRF), 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) contingency fuel; and

(2) FRF,

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 are as specified for planning in point CAT.OP.MPA.245 (a).

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 final reserve fuel (FRF). This is not an emergency situation but an indication that an emergency situation is possible, should any additional delay occur.

SAFE LANDING — FRF PROTECTION

(b) The protection of the FRF 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 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 portion may be consumed prior to landing.

AMC1 CAT.OP.MPA.200 Special refuelling or defueling of 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 operators' competent authority;

(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 operations manual.

AMC2 CAT.OP.MPA.200 Special refuelling or defueling of 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.

AMC3 CAT.OP.MPA.200 Special refuelling or defueling of 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 operations manual 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 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;

(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.

AMC4 CAT.OP.MPA.200 Special refuelling or defueling of 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 operations manual 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 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.

GM1 CAT.OP.MPA.200 Special refuelling or defueling of 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 cooperate to establish such procedures.

GM2 CAT.OP.MPA.200 Special refuelling or defueling of the aircraft

RISK ASSESSMENT FOR REFUELLING WITH THE ENGINE(S) AND/OR ROTORS STOPPED — HELICOPTERS

The risk assessment should explain why it is not practical to refuel with the engine(s) and/or rotors turning, 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, rescue and firefighting capability, number of staff 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.

AMC5 CAT.OP.MPA.200 Special refuelling or defueling of 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/defuelled with avgas (aviation gasoline) or wide-cut type fuel or a mixture of these types of fuel.

(b) For all other types of fuel, 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.

AMC6 CAT.OP.MPA.200 Special refuelling or defueling of 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 is 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.

AMC7 CAT.OP.MPA.200 Special refuelling or defueling of the aircraft

OPERATIONAL PROCEDURES FOR REFUELLING WITH PASSENGERS DISEMBARKING OR EMBARKING — 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 helicopter emergency medical service (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 operations manual should specify that at least the relevant precautions of the aforementioned AMC are taken.

AMC8 CAT.OP.MPA.200 Special refuelling or defueling of 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.

GM2 CAT.OP.MPA.200 Special refuelling or defuelling of the aircraft~~Refuelling/defuelling with wide-cut fuel~~

PROCEDURES FOR REFUELLING/DEFUELLING WITH WIDE-CUT FUEL

(…)

AMC1 CAT.OP.MPA.281 is deleted.

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 (c) ~~in~~of ~~AMC3 CAT.OP.MPA.150(b)~~AMC1 CAT.OP.MPA.191(b)&(c) are complied with.

AMC1 SPA.HOFO.110(a)(4) Operating procedures

REFUELLING PROCEDURE

If refuelling with rotors turning is conducted, a procedure should be established and used in accordance with point CAT.OP.MPA.200.

AMC1 SPA.HOFO.120 Selection of aerodromes and operating sites

COASTAL AERODROME

(a) Any alleviation from the requirement to select an alternate aerodrome for a flight to a coastal aerodrome under instrument flight rules (IFR) routing from offshore should be based on an individual safety risk assessment.

(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 points CAT.OP.MPA.191~~150~~, NCC.OP.131, or SPO.OP.131 except for the alternate fuel;

(…)

AMC1 NCC.GEN.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 MET.TR.215 (a) of Annex V (Part-MET) to Regulation (EU) 2017/373, and comprise the following:

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

(b) supplementary meteorological information other than that specified in point (a), which should be based on data from certified meteorological service providers or other reliable sources that are evaluated by the operator.

GM1 NCC.GEN.140(a)(17) Documents, manuals and information to be carried

RELIABLE SOURCES OF METEOROLOGICAL INFORMATION

In the context of AMC1 NCC.GEN.140(a)(17), 'reliable sources of meteorological information' are the organisations that are evaluated by the operator as being able to provide an appropriate level of data assurance in terms of accuracy and integrity. The operator is recommended to consider the following aspects during the evaluation:

(a) Organisations should have in place a quality assurance system that covers source selection, acquisition/import, processing, validity period check, and distribution phase of data.

(b) Any meteorological product that is provided by organisations within the scope of the meteorological information included in the flight documentation that is defined in point MET.TR.215 (e) of Part-MET should originate only from authoritative sources or certified providers, and should not be transformed or altered, except for the purpose of presenting the data in the correct format. The organisations' process should provide assurance that the integrity of such products is preserved in the data to be used by flight crew and operators, regardless of their form.

(c) The operator is also recommended to monitor the relevant verification data to be able to demonstrate that the data is always fit for purpose.

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 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.

AMC1 NCC.OP.131 Fuel/energy scheme — fuel/energy planning and in-flight replanning policy — aeroplanes

For the fuel planning policy, 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 replanning, 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 (FRF), or for 2 hr, whichever is less; or

(ii) for turbine-engined aeroplanes, the amount of fuel required to fly for 2 hr with normal cruise consumption above the destination aerodrome, including the FRF.

(e) FRF;

(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 1 500 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.

AMC1 NCC.OP.155 Refuelling with passengers embarking, on board, or disembarking

OPERATIONAL PROCEDURES — AEROPLANES~~GENERAL~~

(…)

~~**OPERATIONAL PROCEDURES — AEROPLANES**~~

(…)

~~**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.~~

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 should specify that at least the relevant precautions of the aforementioned AMC are taken.

AMC1 NCC.OP.157 Refuelling with engine(s) running and/or rotors turning — helicopters

OPERATIONAL PROCEDURES — NO PASSENGERS ON BOARD

Operational procedures in the operations manual 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.

AMC2 NCC.OP.157 Refuelling with the 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 operations manual 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 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.

GM1 NCC.OP.157 Refuelling with the engine(s) and/or rotors stopped — helicopters

RISK ASSESSMENT

The risk assessment should explain why it is not practical to refuel with the engine(s) and/or rotors turning, 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 capability, number of staff members available, ease of emergency evacuation of the helicopter, etc.;

(f) assessement 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.

GM1 NCC.OP.205(b)&(d) Fuel/energy scheme — in-flight fuel/energy management policy

FINAL RESERVE FUEL PROTECTION

To ensure a safe landing, the pilot needs to protect the final reserve fuel (FRF) in accordance with point NCC.OP.131 (c)(3). The objective of the FRF 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 can no longer be protected, then a fuel emergency needs to be declared 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 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.

GM1 NCC.OP.205(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 final reserve fuel (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 EASA Fuel manual contain guidance on declaring 'MINIMUM FUEL'.

GM1 NCO.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/energy 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 (PRN). If alternate fuel/energy is carried, the operator is not required to consider the aerodrome as isolated and use the aforementioned operational criteria.

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.

AMC2 NCO.OP.125(b) Fuel/energy and oil supply — aeroplanes and helicopters

FINAL RESERVE FUEL/ENERGY

The quantity of the final reserve fuel/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.

AMC3 NCO.OP.125(b) Fuel/energy and oil supply — aeroplanes and helicopters

FINAL RESERVE FUEL/ENERGY PROTECTION

The planned final reserve fuel (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)).

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).

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.

AMC1 NCO.OP.147 Refuelling with the 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.

GM1 NCO.OP.147 Refuelling with the 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 rotors turning.

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 final reserve fuel (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 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 MET.TR.215 (a) of Annex V (Part-MET) to Regulation (EU) 2017/373, and comprise the following:

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

(b) supplementary meteorological information other than that specified in point (a), which should be based on data from certified meteorological service providers or other reliable sources that are evaluated by the operator.

GM1 SPO.GEN.140(a)(18) Documents, manuals, and information to be carried

RELIABLE SOURCES OF METEOROLOGICAL INFORMATION

In the context of AMC1 SPO.GEN.140(a)(18), 'reliable sources of meteorological information' are the organisations that are evaluated by the operator as being able to provide an appropriate level of data assurance in terms of accuracy and integrity. The operator is recommended to consider the following aspects during the evaluation:

(a) Organisations should have in place a quality assurance system that covers source selection, acquisition/import, processing, validity period check, and distribution phase of data.

(b) Any meteorological product that is provided by organisations within the scope of the meteorological information included in the flight documentation that is defined in point MET.TR.215 (e) of Part-MET should originate only from authoritative sources or certified providers, and should not be transformed or altered, except for the purpose of presenting the data in the correct format. The organisations' process should provide assurance that the integrity of such products is preserved in the data to be used by flight crew and operators, regardless of their form.

(c) The operator is also recommended to monitor the relevant verification data to demonstrate that the data is always fit for purpose.

GM1 SPO.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/energy 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/energy is carried, the operator is not required to consider the aerodrome as isolated and use the aforementioned operational criteria.

AMC1 SPO.OP.131 Fuel/energy scheme — fuel/energy planning and in-flight replanning policy — aeroplanes and helicopters

AEROPLANES

For the fuel planning policy, 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 replanning, 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 final reserve fuel (FRF), or for 2 hr, whichever is less; or

(ii) for turbine-engined aeroplanes, the amount of fuel required to fly for 2 hr with normal cruising consumption above the destination aerodrome, including the FRF;

(e) FRF 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;

when the operator follows point (e)(1) for the FRF, the operator should specify in the standard operating procedures (SOPs):

(5) the type of operation in which such reduced RFR may be used; and

(6) 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 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, the operator should specify in the SOPs:

(1) the type of operation in which such reduced FRF may be used; and

(2) methods of reading and calculating the remaining fuel.

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 fire-fighting, handling communications and initiating and directing an 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.~~

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 should specify that at least the relevant precautions of the aforementioned AMC are taken.

AMC1 SPO.OP.157 Refuelling with engine(s) and/or rotors turning — helicopters
OPERATIONAL PROCEDURES — NO TASK SPECIALISTS ON BOARD

Operational procedures in the operations manual 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.

AMC2 SPO.OP.157 Refuelling with the engine(s) running 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 operations manual 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 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.

GM1 SPO.OP.157 Refuelling with the engine(s) and/or rotors stopped — helicopters

RISK ASSESSMENT

The risk assessment should explain why it is not practical to refuel with the engine(s) and/or rotors turning, 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 capability, number of staff members available, ease of emergency evacuation of the helicopter, etc.;

(f) assessement 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.

GM1 SPO.OP.190(b)&(d) Fuel/energy scheme — in-flight fuel/energy management policy

FINAL RESERVE FUEL PROTECTION

To ensure a safe landing, the pilot needs to protect the final reserve fuel (FRF) in accordance with point SPO.OP.131. The objective of the FRF 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 can no longer be protected, then a fuel emergency needs to be declared 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 EASA Fuel manual contain further detailed guidance on the development of a comprehensive in-flight fuel management policy and related procedures.

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 final reserve fuel (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 EASA Fuel manual contain guidance on declaring 'MINIMUM FUEL'.