

Annex VII to ED Decision 2021/005/R

'AMC and GM to Part-SPO — Initial issue, Amendment 13'

The Annex to Decision 2014/018/R of 24 April 2014 is hereby amended as follows:

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

- deleted text is ~~struck through~~;
- new or amended text is highlighted in **blue**;
- an ellipsis '[...]' indicates that the rest of the text is unchanged.

AMC1 SPO.GEN.145(b) Handling of flight recorder recordings: preservation, production, protection and use

INSPECTIONS AND CHECKS OF RECORDINGS

~~Whenever a flight recorder is required to be carried:~~

- (a) ~~†~~The operator should perform an inspection of the FDR recording and the CVR recording every year unless one or more of the following applies:
- (1) If the flight recorder records on magnetic wire or uses frequency modulation technology, the time interval between two inspections of the recording should not exceed ~~three~~ **3** months.
 - (2) If the flight recorder is solid-state and the flight recorder system is fitted with continuous monitoring for proper operation, the time interval between two inspections of the recording may be up to ~~two~~ **2** years.
 - (3) In the case of an aircraft equipped with two solid-state flight data and cockpit voice combination recorders, where
 - (i) the flight recorder systems are fitted with continuous monitoring for proper operation, and
 - (ii) the flight recorders share the same flight data acquisition, a comprehensive inspection of the recording needs only to be performed for one flight recorder position. The inspection of the recordings should be performed alternately so that each flight recorder position is inspected at least every ~~four~~ **4** years.
 - (4) Where all ~~of~~ the following conditions are met, the inspection of FDR recording is not needed:
 - (i) the aircraft flight data ~~are~~ **is** collected in the frame of a flight data monitoring (FDM) programme;
 - (ii) the data acquisition of mandatory flight parameters is the same for the FDR and for the recorder used for the FDM programme;
 - (iii) an inspection similar to the inspection of the FDR recording and covering all mandatory flight parameters is conducted on the FDM data at time intervals not exceeding ~~two~~ **2** years; and

- (iv) the FDR is solid-state and the FDR system is fitted with 'continuous monitoring for proper operation'.
- (b) The operator should perform every ~~five~~ 5 years an inspection of the data link recording.
- (c) The operator should perform at time intervals not exceeding 2 years, an inspection of the recording of flight recorders other than an FDR, which are installed on an aircraft in order to ensure compliance with SPO.IDE.A.146 or SPO.IDE.H.146.
- (de) When installed, the aural or visual means for preflight checking of the flight recorders for proper operation should be used ~~every day~~ on each day when the aircraft is operated. When no such means is available for a flight recorder, the operator should perform an operational check of this flight recorder at ~~time~~ intervals not exceeding 150 flight hours or ~~seven~~ 7 calendar days of operation, whichever is considered more suitable by the operator.
- (ed) The operator should check every ~~five~~ 5 years, or in accordance with the recommendations of the sensor manufacturer, that the parameters dedicated to the FDR and not monitored by other means are being recorded within the calibration tolerances and that there is no discrepancy in the engineering conversion routines for these parameters.

GM1 SPO.GEN.145(b) Handling of flight recorder recordings: preservation, production, protection and use

INSPECTION OF THE FLIGHT RECORDERS' RECORDINGS FOR ENSURING SERVICEABILITY

- (a) The inspection of the ~~recorded flight parameters~~ ~~FDR recording~~ usually consists of the following:
 - (1) Making a copy of the complete recording file.
 - (2) Converting the recording to parameters expressed in engineering units in accordance with the documentation required to be held.
 - (3) Examining a whole flight in engineering units to evaluate the validity of all mandatory parameters. This could reveal defects or noise in the measuring and processing chains and indicate necessary maintenance actions. The following should be considered:
 - (i) when applicable, each parameter should be expressed in engineering units and checked for different values of its operational range. For this purpose, some parameters may need to be inspected at different flight phases; and
 - (ii) ~~(only applicable to an FDR)~~ if the parameter is delivered by a digital data bus and the same data are utilised for the operation of the aircraft, then a reasonableness check may be sufficient; otherwise a correlation check may need to be performed:
 - (A) a reasonableness check is understood in this context as a subjective, qualitative evaluation, requiring technical judgement, of the recordings from a complete flight; and
 - (B) a correlation check is understood in this context as the process of comparing data recorded by the flight data recorder against the corresponding data derived from flight instruments, indicators or the expected values obtained during specified portion(s) of a flight profile or during ground checks that are conducted for that purpose.

- (4) Retaining the most recent copy of the complete recording file and the corresponding recording inspection report that includes references to the documentation required to be held.
- (b) When performing the ~~CVR recording~~ inspection of an audio recording from a flight recorder, precautions need to be taken to comply with SPO.GEN.145(f)(1a). The inspection of the ~~CVR~~ audio recording usually consists of:
- (1) checking that the ~~CVR~~ flight recorder operates correctly for the nominal duration of the recording;
 - (2) examining ~~where practicable, a~~ samples of in-flight audio recording of the ~~CVR~~ from the flight recorder for evidence that the signal is acceptable on each channel and in all phases of flight; and
 - (3) preparing and retaining an inspection report.
- (c) [...]
- (d) When inspecting images recorded by a flight recorder, precautions need to be taken to comply with SPO.GEN.145(f)(3a). The inspection of such images usually consists of the following:
- (1) checking that the flight recorder operates correctly for the nominal duration of the recording;
 - (2) examining samples of images recorded in different flight phases for evidence that the images of each camera are of acceptable quality; and
 - (3) preparing and retaining an inspection report.

GM3 SPO.GEN.145(b) Handling of flight recorder recordings: preservation, production, protection and use

CVR AUDIO QUALITY

Additional guidance material for performing the CVR recording inspection may be found in the document of the French Bureau d'Enquêtes et d'Analyses, titled 'Guidance on CVR recording inspection' and dated October 2018 or later.

~~Examples of CVR audio quality issues and possible causes thereof may be found in the document of the French Bureau d'Enquêtes et d'Analyses, titled 'Study on detection of audio anomalies on CVR recordings' and dated September 2015³.~~

AMC1 SPO.GEN.145(f)(1) Handling of flight recorder recordings: preservation, production, protection and use

USE OF AUDIO ~~CVR~~ RECORDINGS FOR MAINTAINING OR IMPROVING SAFETY

- (a) The procedure related to the handling of audio recordings from flight recorders and of their transcripts ~~cockpit voice recorder (CVR) recordings~~ should be ~~written in a document which should be~~ documented and signed by all parties (aircraft operator, crew members, maintenance personnel if applicable). This procedure should take into account Regulation (EU) 2016/679 and, as a minimum, define:

- (1) the method to obtain the consent of all crew members and maintenance personnel concerned;
 - (2) an access and security policy that restricts access to audio recordings from flight recorders and their transcripts ~~CVR recordings and identified CVR transcripts~~ to specifically authorised persons identified by their position;
 - (3) a retention policy and accountability, including the measures to be taken to ensure the security of audio recordings from flight recorders and transcripts thereof ~~the CVR recordings and CVR transcripts~~ and their protection from misuse. The retention policy should specify the period of time after which such audio ~~CVR~~ recordings and identified ~~CVR~~ transcripts are destroyed; ~~and~~
 - (4) a description of the uses made of audio recordings from flight recorders and their transcripts ~~the CVR recordings and of their transcripts;~~
 - (5) the participation of flight crew member representatives in the assessment of audio recordings from flight recorders and their transcripts;
 - (6) the conditions under which advisory briefing or remedial training should take place; this should always be carried out in a constructive and non-punitive manner; and
 - (7) the conditions under which actions other than advisory briefing or remedial training may be taken for reasons of gross negligence or significant continuing safety concern.
- (b) Each time an audio recording file from a flight recorder ~~a CVR recording file~~ is read out under the conditions defined by SPO.GEN.145(f)(1):
- (1) parts of the ~~CVR~~ audio recording file that contain information with a privacy content should be deleted to the extent possible, and it should not be permitted that the detail of information with a privacy content is transcribed; and
 - (2) the operator should retain, and when requested, provide to the competent authority:
 - (i) information on the use made (or the intended use) of the ~~CVR~~ audio recording file; and
 - (ii) evidence that the persons concerned consented to the use made (or the intended use) of the audio ~~CVR~~ recording file.
- (c) The person who fulfils the role of a safety manager should be responsible for the protection and use of audio recordings from flight recorders and transcripts thereof, ~~the CVR recordings and of their transcripts~~ as well as for the assessment of issues and their transmission to the manager(s) responsible for the process concerned.
- (d) In case a third party is involved in the use of audio recordings from flight recorders ~~CVR recordings~~, contractual agreements with this third party should cover the aspects enumerated in (a) and (b).

AMC12 SPO.GEN.145(f)(1a) Handling of flight recorder recordings: preservation, production, protection and use

~~CVR RECORDING~~ INSPECTION OF AUDIO RECORDINGS FOR ENSURING SERVICEABILITY

- (a) When an inspection of the audio recordings from a flight recorder ~~the CVR recording~~ is performed for ensuring audio quality and intelligibility of recorded communications:
- (1) the privacy of the audio ~~CVR~~ recordings should be ensured (e.g. by locating the ~~replay~~ equipment in a separated area and/or using headsets);

- (2) access to the CVR replay equipment should be restricted to specifically authorised persons identified by their position;
 - (3) provision should be made for the secure storage of the CVR recording medium, the audio CVR recording files and copies thereof;
 - (4) the audio CVR recording files and copies thereof should be destroyed not earlier than 2 two months and not later than 1 one year after completion of the CVR recording inspection of the audio recordings, except that audio samples with no privacy content may be retained for enhancing the CVR recording this inspection (e.g. for comparing audio quality);
 - (5) only the accountable manager of the operator, and, when identified to comply with ORO.GEN.200, the person fulfilling the role of safety manager should be entitled to request a copy of the audio CVR recording files.
- (b) The conditions enumerated in (a) should also be complied with if the inspection of the audio CVR recordings is subcontracted to a third party. The contractual agreements with the third party should explicitly cover these aspects.

~~GM1 SPO.GEN.145(f) – Handling of flight recorder recordings: preservation, production, protection and use~~

~~USE OF CVR RECORDINGS FOR MAINTAINING OR IMPROVING SAFETY~~

- ~~(a) The CVR is primarily a tool for the investigation of accidents and serious incidents by investigating authorities. Misuse of CVR recordings is a breach of the right to privacy and it works against an effective safety culture inside the operator.~~
- ~~(b) Therefore, the use of a CVR recording, when for purposes other than CVR serviceability or those laid down by Regulation (EU) No 996/2010, should be subject to the free prior consent of the persons concerned, and framed by a procedure that is endorsed by all parties and that protects the privacy of crew members and (if applicable) maintenance staff.~~

AMC1 SPO.GEN.145(f)(3) Handling of flight recorder recordings: preservation, production, protection and use

USE OF IMAGES FROM THE FLIGHT CREW COMPARTMENT FOR MAINTAINING OR IMPROVING SAFETY

- (a) The procedure related to the handling of images of the flight crew compartment that are recorded by a flight recorder should be documented and signed by all parties (aircraft operator, crew members, maintenance personnel if applicable). This procedure should take into account Regulation (EU) 2016/679 and, as a minimum, define the following aspects:
 - (1) the method to obtain the consent of all crew members and maintenance personnel concerned;
 - (2) an access and security policy that restricts access to the image recordings to specifically authorised persons identified by their position;

- (3) a retention policy and accountability, including the measures to ensure the security of the image recordings and their protection from misuse;
 - (4) a description of the uses made of the image recordings.
- (b) Each time a recording file from a flight recorder and containing images of the flight crew compartment is read out for purposes other than to ensure the serviceability of that flight recorder:
- (1) images that contain information with a privacy content should be deleted to the extent possible, and it should not be permitted that the detail of information with a privacy content is transcribed; and
 - (2) the operator should retain and, when requested, provide the competent authority with:
 - (i) information on the use made (or the intended use) of the recording file; and
 - (ii) evidence that the flight crew members concerned consented to the use made (or the intended use) of the flight crew compartment images.
- (c) The person fulfilling the role of safety manager should be responsible for the protection and use of images of the flight crew compartment that are recorded by a flight recorder, as well as for the assessment of issues and their transmission to the manager(s) responsible for the process concerned.
- (d) In case a third party is involved in the use of images of the flight crew compartment that are recorded by a flight recorder, contractual agreements with this third party should cover the aspects enumerated in (a) and (b).

AMC1 SPO.GEN.145(f)(3a) Handling of flight recorder recordings: preservation, production, protection and use

INSPECTION OF IMAGES OF THE FLIGHT CREW COMPARTMENT FOR ENSURING SERVICEABILITY

- (a) When images of the flight crew compartment recorded by a flight recorder are inspected for ensuring the serviceability of the flight recorder, and any body part of a crew member is likely to be visible on these images, then:
- (1) the privacy of the image recordings should be ensured (e.g. by locating the replay equipment in a separated area);
 - (2) access to the replay equipment should be restricted to specifically authorised persons identified by their position;
 - (3) provisions should be made for the secure storage of the recording medium, the image recording files and copies thereof;
 - (4) the image recording files and copies thereof should be destroyed not earlier than 2 months and not later than 1 year after completion of the inspection of the image recordings. Images that do not contain any body part of a person may be retained for enhancing this inspection (e.g. for comparing image quality); and
 - (5) only the accountable manager of the operator and, when identified to comply with ORO.GEN.200, the safety manager should be entitled to request a copy of the image recording files.

- (b) The conditions enumerated in (a) should also be complied with if the inspection of the image recording is subcontracted to a third party. The contractual agreements with the third party should explicitly cover these aspects.

GM1 SPO.GEN.145(f) Handling of flight recorder recordings: preservation, production, protection and use

FLIGHT CREW COMPARTMENT

If there are no compartments to physically segregate the flight crew from the passengers during the flight, the 'flight crew compartment' in point (f) of SPO.GEN.145 should be understood as the area including:

- (a) the flight crew seats;
- (b) aircraft and engine controls;
- (c) aircraft instruments;
- (d) windshield and windows used by the flight crew to get an external view while seated at their duty station; and
- (e) circuit breakers accessible by the flight crew while seated at their duty station.

GM1 SPO.OP.175 Ice and other contaminants — ground procedures

TERMINOLOGY

Terms used in the context of de-icing/anti-icing have the meaning defined in the following subparagraphs.

- ~~(a) 'Anti-icing fluid' includes, but is not limited to, the following:~~
 - ~~(1) Type I fluid if heated to minimum 60°C at the nozzle;~~
 - ~~(2) mixture of water and Type I fluid if heated to minimum 60°C at the nozzle;~~
 - ~~(3) Type II fluid;~~
 - ~~(4) mixture of water and Type II fluid;~~
 - ~~(5) Type III fluid;~~
 - ~~(6) mixture of water and Type III fluid;~~
 - ~~(7) Type IV fluid;~~

~~(8) — mixture of water and Type IV fluid.~~

~~On uncontaminated aircraft surfaces, Type II, III and IV anti-icing fluids are normally applied unheated.~~

~~(b) — ‘Clear ice’: a coating of ice, generally clear and smooth, but with some air pockets. It forms on exposed objects, the temperatures of which are at, below or slightly above the freezing temperature, by the freezing of super-cooled drizzle, droplets or raindrops.~~

~~(c) — Conditions conducive to aircraft icing on the ground (e.g. freezing fog, freezing precipitation, frost, rain or high humidity (on cold-soaked wings), snow or mixed rain and snow).~~

~~(d) — ‘Contamination’, in this context, is understood as being all forms of frozen or semi-frozen moisture, such as frost, snow, slush or ice.~~

~~(e) — ‘Contamination check’: a check of aircraft for contamination to establish the need for de-icing.~~

~~(f) — ‘De-icing fluid’: such fluid includes, but is not limited to, the following:~~

~~(1) — heated water;~~

~~(2) — Type I fluid;~~

~~(3) — mixture of water and Type I fluid;~~

~~(4) — Type II fluid;~~

~~(5) — mixture of water and Type II fluid;~~

~~(6) — Type III fluid;~~

~~(7) — mixture of water and Type III fluid;~~

~~(8) — Type IV fluid;~~

~~(9) — mixture of water and Type IV fluid.~~

~~De-icing fluid is normally applied heated to ensure maximum efficiency.~~

~~(g) — ‘De-icing/anti-icing’: this is the combination of de-icing and anti-icing performed in either one or two steps.~~

~~(h) — ‘Ground ice detection system (GIDS)’: system used during aircraft ground operations to inform the personnel involved in the operation and/or the flight crew about the presence of frost, ice, snow or slush on the aircraft surfaces.~~

~~(i) — ‘Lowest operational use temperature (LOUT)’: the lowest temperature at which a fluid has been tested and certified as acceptable in accordance with the appropriate aerodynamic acceptance test whilst still maintaining a freezing point buffer of not less than:~~

~~(1) — 10°C for a Type I de-icing/anti-icing fluid; or~~

~~(2) — 7°C for Type II, III or IV de-icing/anti-icing fluids.~~

~~(j) — ‘Post-treatment check’: an external check of the aircraft after de-icing and/or anti-icing treatment accomplished from suitably elevated observation points (e.g. from the de-icing/anti-icing equipment itself or other elevated equipment) to ensure that the aircraft is free from any frost, ice, snow, or slush.~~

~~(k) — ‘Pre-take-off check’: an assessment normally performed by the flight crew, to validate the applied HoT.~~

~~(l) — ‘Pre-take-off contamination check’: a check of the treated surfaces for contamination, performed when the HoT has been exceeded or if any doubt exists regarding the continued effectiveness of the applied anti-icing treatment. It is normally accomplished externally, just before commencement of the take-off run.~~

ANTI-ICING CODES

- ~~(m) The following are examples of anti-icing codes:~~
- ~~(1) 'Type I' at (start time) to be used if anti-icing treatment has been performed with a Type I fluid;~~
 - ~~(2) 'Type II/100' at (start time) to be used if anti-icing treatment has been performed with undiluted Type II fluid;~~
 - ~~(3) 'Type II/75' at (start time) to be used if anti-icing treatment has been performed with a mixture of 75 % Type II fluid and 25 % water;~~
 - ~~(4) 'Type IV/50' at (start time) to be used if anti-icing treatment has been performed with a mixture of 50 % Type IV fluid and 50 % water.~~
- ~~(n) When a two-step de-icing/anti-icing operation has been carried out, the anti-icing code should be determined by the second step fluid. Fluid brand names may be included, if desired.~~
- (a) 'Anti-icing': the process of protecting the aircraft to prevent contamination due to existing or expected weather, typically by applying anti-icing fluids on uncontaminated aircraft surfaces.
- (b) 'Anti-icing fluid' includes, but is not limited to, the following:
- (1) Typically, Type II, III or IV fluid (neat or diluted), normally applied unheated (*);
 - (2) Type I fluid/water mixture heated to minimum 60°C at the nozzle.
- (*) When de-icing and anti-icing in a one-step process, Type II and Type IV fluids are typically applied diluted and heated.
- (c) 'Clear ice': a coating of ice, generally clear and smooth, but with some air pockets. It forms on exposed objects, the temperatures of which are at, below or slightly above the freezing temperature, by the freezing of super-cooled drizzle, droplets or raindrops. Clear ice is very difficult to be detected visually.
- (d) 'Cold soaked surface frost (CSSF)': frost developed on cold soaked aircraft surfaces by sublimation of air humidity. This effect can take place at ambient temperatures above 0 °C. Cold soaked aircraft surfaces are more common on aircraft that have recently landed. External surfaces of fuel tanks (e.g. wing skins) are typical areas of CSSF formation (known in this case as cold soaked fuel frost (CSFF)), due to the thermal inertia of very cold fuel that remains on the tanks after landing.
- (e) 'Conditions conducive to aircraft icing on the ground': freezing fog, freezing precipitation, frost, rain or high humidity (on cold soaked wings), hail, ice pellets, snow or mixed rain and snow, etc.
- (f) 'Contamination': all forms of frozen or semi-frozen deposits on an aircraft, such as frost, snow, slush or ice.
- (g) 'Contamination check': a check of the aircraft for contamination to establish the need for de-icing.
- (h) 'De-icing': the process of eliminating frozen contamination from aircraft surfaces, typically by applying de-icing fluids.
- (i) 'De-icing fluid': such fluid includes, but is not limited to, the following:
- (1) Heated water;
 - (2) Preferably, Type I fluid (neat or diluted (typically));
 - (3) Type II, III or IV fluid (neat or diluted).
- The de-icing fluid is normally applied heated to ensure maximum efficiency and its freezing point should be at the outside air temperature (OAT) or below.
- (j) 'De-icing/anti-icing': this is the combination of de-icing and anti-icing performed in either one or two steps.

- (k) 'Ground ice detection system (GIDS)': a system used during aircraft ground operations to inform the personnel involved in the operation and/or the flight crew about the presence of frost, ice, snow or slush on the aircraft surfaces.
- (l) 'Holdover time (HOT)': the period of time during which an anti-icing fluid provides protection against frozen contamination to the treated aircraft surfaces. It depends among other variables, on the type and intensity of the precipitation, OAT, wind, the particular fluid (or fluid Type) and aircraft design and aircraft configuration during the treatment.
- (m) 'Liquid water equivalent (LWE) system': an automated weather measurement system that determines the LWE precipitation rate in conditions of frozen or freezing precipitation. The system provides flight crew with continuously updated information on the fluid protection capability under varying weather conditions.
- (n) 'Lowest operational use temperature (LOUT)': the lowest temperature at which a fluid has been tested and certified as acceptable in accordance with the appropriate aerodynamic acceptance test whilst still maintaining a freezing point buffer of not less than:
- (1) 10°C for a Type I fluid; or
 - (2) 7°C for Type II, III or IV fluids.
- (o) 'Post-treatment check', 'Post- de-icing check' or 'Post- de-icing/anti-icing check': an external check of the aircraft after de-icing and/or anti-icing treatment accomplished by qualified staff and from suitably elevated observation points (e.g. from the de-icing/anti-icing equipment itself or other elevated equipment) to ensure that the aircraft is free from frost, ice, snow, or slush.
- (p) 'Pre-take-off check': The flight crew should continuously monitor the weather conditions after the de-icing/anti-icing treatment to assess whether the applied holdover time is still appropriate. Within the aircraft's HOT and prior to take-off, the flight crew should check the aircraft's wings or representative aircraft surfaces for frozen contaminants.
- (q) 'Pre-take-off contamination check': a check of the treated surfaces for contamination, performed when the HOT has been exceeded or if any doubt exists regarding the continued effectiveness of the applied anti-icing treatment. It is normally accomplished externally, just before commencement of the take-off run.

ANTI-ICING CODES

- (r) Upon completion of the anti-icing treatment, a qualified staff provides the anti-icing code to the flight crew as follows: 'the fluid Type/the fluid name (except for Type I)/concentration (except for Type I)/local time at start of anti-icing/date (optional)/the statement 'post- de-icing/anti-icing check completed' (if check completed). Example:
- 'TYPE II / MANUFACTURER, BRAND X / 75% / 1335 / 15FEB20 / POST- DE-ICING/ANTI-ICING CHECK COMPLETED'.
- (s) When a two-step de-icing/anti-icing operation has been carried out, the anti-icing code should be determined by the second step fluid.

GM2 SPO.OP.175 Ice and other contaminants — ground procedures

DE-ICING/ANTI-ICING — PROCEDURES

- (a) De-icing and/or anti-icing procedures should take into account manufacturer's recommendations, including those that are type-specific and cover:

- (1) contamination checks, including detection of clear ice and under-wing frost; limits on the thickness/area of contamination published in the AFM or other manufacturers' documentation should be followed;
- (2) procedures to be followed if de-icing and/or anti-icing procedures are interrupted or unsuccessful;
- (3) post-treatment checks;
- (4) pre-take-off checks;
- (5) pre-take-off contamination checks;
- (6) the recording of any incidents relating to de-icing and/or anti-icing; and
- (7) the responsibilities of all personnel involved in de-icing and/or anti-icing.

(b) Operator's procedures should ensure the following:

- (1) When aircraft surfaces are contaminated by ice, frost, slush or snow, they are de-iced prior to take-off according to the prevailing conditions. Removal of contaminants may be performed with mechanical tools, fluids (including hot water), infrared heat or forced air, taking account of aircraft type-specific provisions.
- (2) Account is taken of the wing skin temperature versus ~~outside air temperature (OAT)~~, as this may affect:
 - (i) the need to carry out aircraft de-icing and/or anti-icing; and/or
 - (ii) the performance of the de-icing/anti-icing fluids.

~~(3) When freezing precipitation occurs or there is a risk of freezing precipitation occurring that would contaminate the surfaces at the time of take-off, aircraft surfaces should be anti-iced. If both de-icing and anti-icing are required, the procedure may be performed in a one- or two-step process, depending upon weather conditions, available equipment, available fluids and the desired hold-over time (HOT). One-step de-icing/anti-icing means that de-icing and anti-icing are carried out at the same time, using a mixture of de-icing/anti-icing fluid and water. Two-step de-icing/anti-icing means that de-icing and anti-icing are carried out in two separate steps. The aircraft is first de-iced using heated water only or a heated mixture of de-icing/anti-icing fluid and water. After completion of the de-icing operation, a layer of a mixture of de-icing/anti-icing fluid and water, or of de-icing/anti-icing fluid only, is sprayed over the aircraft surfaces. The second step will be taken before the first step fluid freezes, typically within three minutes and, if necessary, area by area.~~

(3) When freezing precipitation occurs or there is a risk of freezing precipitation occurring that would contaminate the surfaces at the time of take-off, aircraft surfaces should be anti-iced. Anti-icing fluids (neat or diluted) should not be applied at OAT below their LOU. If both de-icing and anti-icing are required, the procedure may be performed in a one- or two-step process, depending upon weather conditions, available equipment, available fluids and the desired HOT. One-step de-icing/anti-icing means that de-icing and anti-icing are carried out at the same time, using a mixture of de-icing/anti-icing fluid and water. Two-step de-icing/anti-icing means that de-icing and anti-icing are carried out in two separate steps. The aircraft is first de-iced using heated water only or a heated mixture of de-icing/anti-icing fluid and water. After completion of the de-icing operation, a layer of a mixture of de-icing/anti-icing fluid and water, or of de-icing /anti-icing fluid only, is sprayed over the aircraft surfaces. The second step will be taken

before the first step fluid freezes (typically within 3 minutes but severe conditions may shorten this) and, if necessary, area by area.

- (4) When an aircraft is anti-iced and a longer ~~Hot~~HOT is needed/desired, the use of a less diluted ~~Type II or Type IV~~ thickened fluid may be considered.
 - (5) All restrictions relative to OAT and fluid application (including, but not necessarily limited to, temperature and pressure) published by the fluid manufacturer and/or aircraft manufacturer, are followed and procedures, limitations and recommendations to prevent the formation of fluid residues are followed.
 - (6) During conditions conducive to aircraft icing on the ground or after de-icing and/or anti-icing, an aircraft is not dispatched for departure unless it has been given a contamination check or a post-treatment check by a trained and qualified person. This check should cover all treated surfaces of the aircraft and be performed from points offering sufficient ~~accessibility~~visibility to these parts. To ensure that there is no clear ice on suspect areas, it may also be necessary to make a physical check (e.g. tactile).
 - (7) The required entry is made in the technical log.
 - (8) The commander continually monitors the environmental situation after the performed treatment. Prior to take-off, he/she performs a pre-take-off check, which is an assessment of whether the applied ~~Hot~~HOT is still appropriate. This pre-take-off check includes, but is not limited to, factors such as precipitation, wind and OAT.
 - (9) If any doubt exists as to whether a deposit may adversely affect the aircraft's performance and/or controllability characteristics, the commander should arrange for a re-treatment or a pre-take-off contamination check to be performed in order to verify that the aircraft's surfaces are free of contamination. Special methods and/or equipment may be necessary to perform this check, especially at night time or in extremely adverse weather conditions. If this check cannot be performed just before take-off, re-treatment should be applied.
 - (10) When re-treatment is necessary, any residue of the previous treatment should be removed, and a completely new de-icing/anti-icing treatment should be applied.
 - (11) When a ground ice detection system (GIDS) is used to perform an aircraft surfaces check prior to and/or after a treatment, the use of GIDS by suitably trained personnel should be part of the procedure.
- (c) Special operational considerations
- (1) When using thickened de-icing/anti-icing fluids, the operator should consider a two-step deicing/anti-icing procedure, the first step preferably with hot water and/or un-thickened fluids.
 - (2) The use of de-icing/anti-icing fluids should be in accordance with the aircraft manufacturer's documentation. This is particularly important for thickened fluids to assure sufficient flow-off during take-off. Avoid applying excessive thickened fluid on the horizontal tail of aircraft with unpowered elevator controls.
 - (3) The operator should comply with any type-specific operational provision(s), such as an aircraft mass decrease and/or a take-off speed increase associated with a fluid application.
 - (4) The operator should take into account any flight handling procedures (stick force, rotation speed and rate, take-off speed, aircraft attitude etc.) laid down by the aircraft manufacturer when associated with a fluid application.

- (5) The limitations or handling procedures resulting from (c)(3) and/or (c)(4) above should be part of the flight crew pre take-off briefing.

(d) Communications

- (1) Before aircraft treatment. When the aircraft is to be treated with the flight crew on board, the flight and personnel involved in the operation should confirm the fluid to be used, the extent of treatment required and any aircraft type-specific procedure(s) to be used. Any other information needed to apply the ~~HoT~~HOT tables should be exchanged.
- (2) Anti-icing code. The operator's procedures should include an anti-icing code, which indicates the treatment the aircraft has received. This code provides the flight crew with the minimum details necessary to estimate a ~~HoT~~HOT and confirms that the aircraft is free of contamination.
- (3) After treatment. Before reconfiguring or moving the aircraft, the flight crew should receive a confirmation from the qualified personnel involved in the operation that all de-icing and/or anti-icing operations are complete and that all personnel and equipment are clear of the aircraft.

(e) Holdover protection & LWE systems

~~The operator should publish in the operations manual, when required, the HoTs in the form of a table or a diagram, to account for the various types of ground icing conditions and the different types and concentrations of fluids used. However, the times of protection shown in these tables are to be used as guidelines only and are normally used in conjunction with the pre take-off check.~~

The operator should publish in the operations manual (OM), when required, the HOTs in the form of a table or a diagram, to account for the various types of ground icing conditions and the different types and concentrations of fluids used. However, the times of protection shown in these tables are to be used as guidelines only and are normally used in conjunction with the pre-take-off check.

An operator may choose to operate using LWE systems instead of HOT tables whenever the required means for using these systems are in place.

(f) Training

~~The operator's initial and recurrent de-icing and/or anti-icing training programmes (including communication training) for flight crew and those of its personnel involved in the operation who are involved in de-icing and/or anti-icing should include additional training if any of the following is introduced:~~

The operator's initial and recurrent de-icing training programmes (including communication training) for flight crew and for other personnel involved in de-icing operations should include additional training if any of the following is introduced:

- (1) a new method, procedure and/or technique;
- (2) a new type of fluid and/or equipment; or
- (3) a new type of aircraft.

(g) Contracting

When the operator contracts de-icing/anti-icing **functions**, the operator should ensure that the contractor complies with the operator's training/qualification procedures, together with any specific procedures in respect of:

- ~~(1) de-icing and/or anti-icing methods and procedures;~~
- ~~(2) fluids to be used, including precautions for storage and preparation for use;~~

~~(3) specific aircraft requirements (e.g. no-spray areas, propeller/engine de-icing, APU operation etc.); and~~

~~(4) checking and communications procedures.~~

(1) roles and responsibilities;

(2) de-icing and/or anti-icing methods and procedures;

(3) fluids to be used, including precautions for storage, preparation for use and chemical incompatibilities;

(4) specific aircraft provisions (e.g. no-spray areas, propeller/engine de-icing, APU operation etc.);

(5) different checks to be conducted; and

(6) procedures for communications with flight crew and any other third party involved.

(h) Special maintenance considerations

(1) General

The operator should take proper account of the possible side-effects of fluid use. Such effects may include, but are not necessarily limited to, dried and/or re-hydrated residues, corrosion and the removal of lubricants.

(2) Special considerations regarding residues of dried fluids

The operator should establish procedures to prevent or detect and remove residues of dried fluid. If necessary, the operator should establish appropriate inspection intervals based on the recommendations of the airframe manufacturers and/or the operator's own experience:

(i) Dried fluid residues

Dried fluid residues could occur when surfaces have been treated and the aircraft has not subsequently been flown and has not been subject to precipitation. The fluid may then have dried on the surfaces.

(ii) Re-hydrated fluid residues

Repetitive application of thickened de-icing/anti-icing fluids may lead to the subsequent formation/build-up of a dried residue in aerodynamically quiet areas, such as cavities and gaps. This residue may re-hydrate if exposed to high humidity conditions, precipitation, washing, etc., and increase to many times its original size/volume. This residue will freeze if exposed to conditions at or below 0 °C. This may cause moving parts, such as elevators, ailerons, and flap actuating mechanisms to stiffen or jam in-flight. Re-hydrated residues may also form on exterior surfaces, which can reduce lift, increase drag and stall speed. Re-hydrated residues may also collect inside control surface structures and cause clogging of drain holes or imbalances to flight controls. Residues may also collect in hidden areas, such as around flight control hinges, pulleys, grommets, on cables and in gaps.

(iii) Operators are strongly recommended to obtain information about the fluid dry-out and re-hydration characteristics from the fluid manufacturers and to select products with optimised characteristics.

(iv) Additional information should be obtained from fluid manufacturers for handling, storage, application and testing of their products.

GM3 SPO.OP.175 Ice and other contaminants — ground procedures

DE-ICING/ANTI-ICING BACKGROUND INFORMATION

Further guidance material on this issue is given in the ICAO *Manual of Aircraft Ground De-icing/Anti-icing Operations* (Doc 9640) ~~(hereinafter referred to as the ICAO *Manual of Aircraft Ground De-icing/Anti-icing Operations*).~~

(a) General

- (1) Any deposit of frost, ice, snow or slush on the external surfaces of an aircraft may drastically affect its flying qualities because of reduced aerodynamic lift, increased drag and modified stability and control characteristics. Furthermore, freezing deposits may cause moving parts, such as elevators, ailerons, flap actuating mechanism etc., to jam and create a potentially hazardous condition. Propeller/engine/auxiliary power unit (APU)/systems performance may deteriorate due to the presence of frozen contaminants on blades, intakes and components. Also, engine operation may be seriously affected by the ingestion of snow or ice, thereby causing engine stall or compressor damage. In addition, ice/frost may form on certain external surfaces (e.g. wing upper and lower surfaces, etc.) due to the effects of cold fuel/structures, even in ambient temperatures well above 0 °C.
- (2) Procedures established by the operator for de-icing and/or anti-icing are intended to ensure that the aircraft is clear of contamination so that degradation of aerodynamic characteristics or mechanical interference will not occur and, following anti-icing, to maintain the airframe in that condition during the appropriate ~~Hot~~HOT.
- ~~(3) Under certain meteorological conditions, de-icing and/or anti-icing procedures may be ineffective in providing sufficient protection for continued operations. Examples of these conditions are freezing rain, ice pellets and hail, heavy snow, high wind velocity, fast dropping OAT or any time when freezing precipitation with high water content is present. No Hot guidelines exist for these conditions.~~
- (3) Under certain meteorological conditions, de-icing and/or anti-icing procedures may be ineffective in providing sufficient protection for continued operations. Examples of these conditions are freezing rain, ice pellets and hail snow exceeding certain intensities, high wind velocity, and fast-dropping OAT. No HOT guidelines exist for these conditions.
- (4) Material for establishing operational procedures can be found, for example, in:
 - ~~(i) ICAO Annex 3, Meteorological Service for International Air Navigation;~~
 - ~~(ii) ICAO Manual of Aircraft Ground De-icing/Anti-icing Operations;~~
 - ~~(iii) ISO 11075 Aircraft De-icing/anti-icing fluids—ISO type I;~~
 - ~~(iv) ISO 11076 Aircraft De-icing/anti-icing methods with fluids;~~
 - ~~(v) ISO 11077 Aerospace Self-propelled de-icing/anti-icing vehicles—Functional requirements;~~
 - ~~(vi) ISO 11078 Aircraft De-icing/anti-icing fluids—ISO types II, III and IV;~~
 - ~~(vii) AEA 'Recommendations for de-icing/anti-icing of aircraft on the ground';~~
 - ~~(viii) AEA 'Training recommendations and background information for de-icing/anti-icing of aircraft on the ground';~~
 - ~~(ix) EUROCAE ED-104A Minimum Operational Performance Specification for Ground Ice Detection Systems;~~

- ~~(x) SAE AS5681 Minimum Operational Performance Specification for Remote On-Ground Ice Detection Systems;~~
- ~~(xi) SAE ARP4737 Aircraft De-icing/anti-icing methods;~~
- ~~(xii) SAE AMS1424 De-icing/anti-icing Fluid, Aircraft, SAE Type I;~~
- ~~(xiii) SAE AMS1428 Fluid, Aircraft De-icing/anti-icing, Non-Newtonian, (Pseudoplastic), SAE Types II, III, and IV;~~
- ~~(xiv) SAE ARP1971 Aircraft De-icing Vehicle—Self-Propelled, Large and Small Capacity;~~
- ~~(xv) SAE ARP5149 Training Programme Guidelines for De-icing/anti-icing of Aircraft on Ground; and~~
- ~~(xvi) SAE ARP5646 Quality Program Guidelines for De-icing/anti-icing of Aircraft on the Ground.~~
- (i) ICAO Annex 3 'Meteorological Service for International Air Navigation';
- (ii) ICAO 'Manual of Aircraft Ground De-icing/Anti-icing Operations';
- (iii) SAE AS6285 'Aircraft Ground Deicing/Anti-Icing Processes';
- (iv) SAE AS6286 'Aircraft Ground Deicing/Anti-Icing Training and Qualification Program';
- (iv) SAE AS6332 'Aircraft Ground Deicing/Anti-icing Quality Management';
- (v) SAE ARP6257 'Aircraft Ground De/Anti-Icing Communication Phraseology for Flight and Ground Crews';
- (vi) FAA Holdover Time Guidelines
- (vii) FAA 8900.xxx series Notice 'Revised FAA-Approved Deicing Program Updates, Winter 20xx-20yy'.

(b) Fluids

- ~~(1) Type I fluid: Due to its properties, Type I fluid forms a thin, liquid-wetting film on surfaces to which it is applied which, under certain weather conditions, gives a very limited HoT. With this type of fluid, increasing the concentration of fluid in the fluid/water mix does not provide any extension in HoT.~~
- ~~(2) Type II and Type IV fluids contain thickeners which enable the fluid to form a thicker liquid-wetting film on surfaces to which it is applied. Generally, this fluid provides a longer HoT than Type I fluids in similar conditions. With this type of fluid, the HoT can be extended by increasing the ratio of fluid in the fluid/water mix.~~
- (1) Type I fluid: Due to its properties, Type I fluid forms a thin, liquid-wetting film on surfaces to which it is applied which, under certain weather conditions, gives a very limited HOT. For anti-icing purposes the fluid/water mixture should have a freezing point of at least 10 °C below OAT; increasing the concentration of fluid in the fluid/water mix does not provide any extension in HOT.
- (2) Type II and Type IV fluids contain thickeners which enable the fluid to form a thicker liquid-wetting film on surfaces to which it is applied. Generally, this fluid provides a longer HOT than Type I fluids in similar conditions.
- (3) Type III fluid is a thickened fluid especially intended for use on aircraft with low rotation speeds.
- ~~(4) Fluids used for de-icing and/or anti-icing should be acceptable to the operator and the aircraft manufacturer. These fluids normally conform to specifications such as SAE AMS1424, SAE AMS1428 or equivalent. Use of non-conforming fluids is not recommended due to their~~

~~characteristics being unknown. The anti-icing and aerodynamic properties of thickened fluids may be seriously degraded by, for example, inappropriate storage, treatment, application, application equipment and age.~~

(4) Fluids used for de-icing and/or anti-icing should be acceptable to the operator and the aircraft manufacturer. These fluids normally conform to specifications such as SAE AMS1424 (Type I) or SAE AMS1428 (Types II, III and IV). Use of non-conforming fluids is not recommended due to their characteristics being unknown. The anti-icing and aerodynamic properties of thickened fluids may be seriously degraded by, for example, inappropriate storage, treatment, application, application equipment, age and in case they are applied on top of non-chemically compatible de-icing fluids.

(c) Holdover protection

- (1) Holdover protection is achieved by a layer of anti-icing fluid remaining on and protecting aircraft surfaces for a period of time. With a one-step de-icing/anti-icing procedure, the ~~HoT~~**HOT** begins at the commencement of de-icing/anti-icing. With a two-step procedure, the ~~HoT~~**HOT** begins at the commencement of the second (anti-icing) step. The holdover protection runs out:
 - (i) at the commencement of the take-off roll (due to aerodynamic shedding of fluid); or
 - (ii) when frozen deposits start to form or accumulate on treated aircraft surfaces, thereby indicating the loss of effectiveness of the fluid.
- (2) The duration of holdover protection may vary depending on the influence of factors other than those specified in the ~~HoT~~**HOT** tables. Guidance should be provided by the operator to take account of such factors, which may include:
 - (i) atmospheric conditions, e.g. exact type and rate of precipitation, wind direction and velocity, relative humidity and solar radiation; and
 - (ii) the aircraft and its surroundings, such as aircraft component inclination angle, contour and surface roughness, surface temperature, operation in close proximity to other aircraft (jet or propeller blast) and ground equipment and structures.
- (3) ~~HoT~~**HOT**s are not meant to imply that flight is safe in the prevailing conditions if the specified ~~HoT~~**HOT** has not been exceeded. Once airborne, certain meteorological conditions, such as freezing drizzle or freezing rain, may be beyond the certification envelope of the aircraft.

AMC1 SPO.OP.210 Approach and landing conditions — aeroplanes and helicopters

LANDING DISTANCE ASSESSMENT — COMPLEX AEROPLANES ~~/FATO SUITABILITY~~

- (a) The in-flight ~~determination of the~~ landing distance ~~/FATO suitability~~ assessment should be based on the latest available ~~meteorological weather~~ report ~~or the locally observed conditions where appropriate~~ and runway condition report (RCR) or equivalent information based on the RCR.
- (b) The assessment should be initially carried out when the weather report and the RCR are obtained, usually around top of descent. If the planned duration of the flight does not allow the flight crew to carry out the assessment in non-critical phases of flight, the assessment should be carried out before departure.

- (c) When meteorological conditions may lead to a degradation of the runway surface condition, the assessment should include consideration of how much deterioration in runway surface friction characteristics may be tolerated, so that a quick decision can be made prior to landing.
- (d) The flight crew should monitor the evolution of the actual conditions during the approach, to ensure that they do not degrade below the condition that was previously determined to be the minimum acceptable.
- (e) The in-flight determination of the landing distance should be done in such a way that either:
 - (1) the landing distance available (LDA) on the intended runway is at least 115 % of the landing distance at the estimated time of landing, determined in accordance with the performance information for the assessment of the landing distance at time of arrival (LDTA); or
 - (2) if performance information for the assessment of the LDTA is not available, the LDA on the intended runway at the estimated time of landing is at least the landing distance determined at the time of dispatch.
- (f) If performance information for the assessment of the LDTA is available, it should be based on approved data contained in the AFM, or on other data that is either determined in accordance with the applicable certification standards for aeroplanes or determined by EASA.
- (g) Whenever the runway braking action encountered during the landing roll is not as good as reported by the aerodrome operator in the RCR, the pilot-in-command should notify the air traffic services (ATS) by means of a special air-report (AIREP) as soon as practicable.

LANDING DISTANCE ASSESSMENT — OTHER-THAN-COMPLEX AEROPLANES

- (a) The in-flight landing distance assessment should be based on the latest available weather report and, if available, RCR.
- (b) The assessment should be initially carried out when weather report and RCR are obtained, usually around top of descent. If the planned duration of the flight does not allow the flight crew to carry out the assessment in non-critical phases of flight, the assessment should be carried out before departure.
- (c) When meteorological conditions may lead to a degradation of the runway surface condition, the assessment should include consideration of how much deterioration in runway surface friction characteristics may be tolerated, so that a quick decision can be made prior to landing.
- (d) Whenever the runway braking action encountered during the landing roll is not as good as reported by the aerodrome operator in the RCR, the pilot-in-command should notify ATS by means of an AIREP as soon as practicable.

GM1 SPO.OP.210 Approach and landing conditions — aeroplanes

LANDING DISTANCE — COMPLEX AEROPLANES

The assessment of the landing distance begins with the acquisition of the latest available weather information and the RCR. The information provided in the RCR is divided in two sections:

- (a) The 'aircraft performance' section which contains information that is directly relevant in a performance computation.

(b) The 'situational awareness' section which contains information that the flight crew should be aware of for a safe operation, but which does not have a direct impact on the performance assessment.

The 'aircraft performance' section of the RCR includes an RWYCC, the contaminant type, depth and coverage for each third of the runway.

The determination of the RWYCC is based on the use of the runway condition assessment matrix (RCAM); however, the presentation of the information in the RCAM is appropriate for use by aerodrome personnel trained and competent in assessing the runway condition in a way that is relevant to aircraft performance. While full implementation of the RCAM standard will eventually no longer require the flight crew to derive from various information available to them the appropriate runway condition to be used for the landing performance assessment at the time of arrival, it is desirable that pilots maintain an understanding of the performance effect of various components considered in the assessment.

It is the task of the aerodrome personnel to report the appropriate RWYCC in order to allow the flight crew to assess the landing performance characteristics of the runway in use. When no RWYCC is available in winter conditions, the RCAM provides the flight crew with a combination of the relevant information (runway surface conditions: state and/or contaminant or AIREP in order to determine the RWYCC.

Table 1 below is an excerpt of the RCAM and permits to carry out the primary assessment based on the reported contaminant type and depth, as well as on the OAT.

Table 1: Association between the runway surface condition and the RWYCC based on the reported contaminant type and depth and on the OAT

Runway surface condition	Surface condition descriptor	Depth	Notes	RWYCC
Dry		n/a		6
Wet	Damp (any visible dampness)	3 mm or less	Including wet or contaminated runways below 25 % coverage in each runway third	5
	Wet			
Slippery wet				3
Contaminated	Compacted snow	Any	At or below OAT – 15 °C ³	4
			Above OAT – 15 °C ³	3
	Dry snow	3 mm or less		5
		More than 3 mm up to 100 mm	Including when any depth occurs on top of compacted snow	3
		Any	On top of ice	0 ²
	Frost ¹	Any		5
	Ice	Any	In cold and dry conditions	1

	Slush	3 mm or less		5
		More than 3 mm up to 15 mm		2
	Standing water	3 mm or less		5
		More than 3 mm up to 15 mm		2
		Any	On top of ice	0 ²
	Wet ice	Any		0 ²
	Wet snow	3 mm or less		5
		More than 3 mm up to 30 mm	Including when any depth occurs on top of compacted snow	3
		Any	On top of ice	0 ²

Note 1: Under certain conditions, frost may cause the surface to become very slippery.

Note 2: Operations in conditions where less-than-poor braking action prevails are prohibited.

Note 3: The runway surface temperature should preferably be used where available.

A primary assessment may have to be downgraded by the aerodrome operator based on an AIREP of lower braking action than the one typically associated with the type and depth of contaminant on the runway or any other observation.

Upgrading a RWYCC 5, 4, 3 or 2 determined by the aerodrome operator from the observed contaminant type is not allowed.

A RWYCC 1 or 0 maybe be upgraded by the aerodrome operator to a maximum of RWYCC 3. The reason for the upgrade will be specified in the 'situational awareness' section of the RCR.

When the aerodrome operator is approved for operations on specially prepared winter runways, in accordance with Annex V (Part-ADR.OPS) to Regulation (EU) No 139/2014, the RWYCC of a runway that is contaminated with compacted snow or ice, may be upgraded to RWYCC 4 depending upon a specific treatment of the runway. In such cases, the reason for the upgrade will be specified in the 'situational awareness' section of the RCR.

GM2 SPO.OP.210 Approach and landing conditions — aeroplanes

RCR, RWYCC and RCAM — COMPLEX AEROPLANES

A detailed description of the RCR format and content, the RWYCC and the RCAM may be found in Annex V (Part-ADR.OPS) to Regulation (EU) No 139/2014. Further guidance may be found in the following documents:

- (a) ICAO Doc 9981 'PANS Aerodromes';
- (b) ICAO Doc 4444 'PANS ATM';
- (c) ICAO Doc 10064 'Aeroplane Performance Manual'; and

(d) ICAO Circular 355 'Assessment, Measurement and Reporting of Runway Surface Conditions'.

RUNWAY CONDITION REPORT (RCR) — OTHER-THAN-COMPLEX AEROPLANES

When the aerodrome reports the runway conditions by means of an RCR, the information thereby contained, includes a RWYCC. The determination of the RWYCC is based on the use of the RCAM. The RCAM correlates the RWYCC with the contaminant present on the runway and the braking action.

A detailed description of the RCR format and content, the RWYCC and the RCAM may be found in Annex V (Part-ADR.OPS) to Regulation (EU) No 139/2014. Further guidance may be found in the following documents:

- (a) ICAO Doc 9981 'PANS Aerodromes';
- (b) ICAO Doc 4444 'PANS ATM';
- (c) ICAO Doc 10064 'Aeroplane Performance Manual'; and
- (d) ICAO Circular 355 'Assessment, Measurement and Reporting of Runway Surface Conditions'.

GM3 SPO.OP.210 Approach and landing conditions — aeroplanes

COMPLEX MOTO-POWERED AEROPLANES — PERFORMANCE INFORMATION FOR THE ASSESSMENT OF LDTA

Guidance on performance information for the assessment of the LDTA may be found in:

- (a) AMC1 CAT.OP.MPA.303(e) of the AMC & GM to Annex IV (Part CAT) to Regulation (EU) No 965/2012; and
- (b) ICAO Doc 10064 'Aeroplane Performance Manual'.

GM4 SPO.OP.210 Approach and landing conditions — aeroplanes

REPORTING ON RUNWAY BRAKING ACTION — COMPLEX AEROPLANES

The role of the flight crew in the runway surface condition reporting process does not end once a safe landing has been achieved. While the aerodrome operator is responsible for generating the RCR, flight crew are responsible for providing accurate braking action reports.

The flight crew braking action reports provide feedback to the aerodrome operator regarding the accuracy of the RCR resulting from the observed runway surface conditions.

ATC passes these braking action reports to the aerodrome operator, which in turn uses them in conjunction with the RCAM to determine if it is necessary to downgrade or upgrade the RWYCC.

During busy times, runway inspections and maintenance may be less frequent and need to be sequenced with arrivals. Therefore, aerodrome operators may depend on braking action reports to confirm that the runway surface condition is not deteriorating below the assigned RCR.

Since both the ATC and the aerodrome operator rely on accurate braking action reports, flight crew should use standardised terminology in accordance with ICAO Doc 4444 — 'PANS ATM'.

The following Table 1 shows the correlation between the terminology to be used in the AIREP to report the braking action and the RWYCC.

Table 1: Association between AIREP and RWYCC

AIREP (braking action)	Description	RWYCC
N/A		6
GOOD	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	5
GOOD TO MEDIUM	Braking deceleration OR directional control is between good and medium.	4
MEDIUM	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	3
MEDIUM TO POOR	Braking deceleration OR directional control is between medium and poor.	2
POOR	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	1
LESS THAN POOR	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	0

An AIREP should be transmitted to the ATC, in accordance with one of the following specifications, as applicable:

- (a) Good braking action is reported as 'BRAKING ACTION GOOD'.
- (b) Good to medium braking action is reported as 'BRAKING ACTION GOOD TO MEDIUM'.
- (c) Medium braking action is reported as 'BRAKING ACTION MEDIUM'.
- (d) Medium to poor braking action is reported as 'BRAKING ACTION MEDIUM TO POOR'.
- (e) Poor braking action is reported as 'BRAKING ACTION POOR'.
- (f) Less than poor braking action is reported as 'BRAKING ACTION LESS THAN POOR'.

In some cases, the differences between two consecutive levels of the six braking action categories between 'Good' and 'Less than Poor' may be too subtle for the flight crew to detect. It is therefore acceptable for the flight crew to report on a more coarse scale of 'Good', 'Medium' and 'Poor'.

Whenever requested by ATC, or if the braking action encountered during the landing roll is not as previously reported by the aerodrome operator in the RCR, pilots should provide a braking action report. This is especially important and safety relevant where the experienced braking action is worse than the braking action associated with any RWYCC code currently in effect for that portion of the runway concerned.

When the experienced braking action is better than that reported by the aerodrome operator, it is important to report this information, which may trigger further actions for the aerodrome operator in order to upgrade the RCR.

If an aircraft-generated braking action report is available, it should be transmitted, identifying its origin accordingly. If the flight crew have reason to modify the aircraft-generated braking action report based on their judgement, the commander should be able to amend such report.

A braking action AIREP of 'Less than Poor' leads to a runway closure until the aerodrome operator can improve the runway condition.

An air safety report should be submitted whenever flight safety has been endangered due to low braking action.

GM5 SPO.OP.210 Approach and landing conditions — aeroplanes

FLIGHT CREW TRAINING

Flight crew should be trained on the use of the RCR, on the use of performance data for the assessment of the LDTA, if available, and on reporting braking action using the AIREP format.

Guidance to develop the content of the training may be found in:

- (a) AMC1 CAT.OP.MPA.303 & CAT.OP.MPA.311 of the AMC & GM to Annex IV (Part CAT) to Regulation (EU) No 965/2012, as applicable to the intended operations;
- (b) ICAO Doc 10064 'Aeroplane Performance Manual'; and
- (c) ICAO Circular 355 'Assessment, Measurement and Reporting of Runway Surface Conditions'.

FLIGHT CREW TRAINING — OTHER-THAN-COMPLEX AEROPLANES

When the aerodrome reports the runway conditions by means of a RCR, flight crew should be trained on the use of the RCR for the assessment of the landing distance, and on reporting braking action using the AIREP format. Guidance to develop the content of the training may be found in:

- (a) ICAO Doc 10064 'Aeroplane Performance Manual'; and
- (b) ICAO Circular 355 'Assessment, Measurement and Reporting of Runway Surface Conditions'.

AMC1 SPO.OP.211 Approach and landing conditions — helicopters

FATO SUITABILITY

The in-flight determination of the FATO suitability should be based on the latest available meteorological report.

GM1 SPO.POL.130(a)(4) Take-off — complex motor-powered aeroplanes

RUNWAY SURFACE CONDITION

Operation on runways contaminated with water, slush, snow or ice implies uncertainties with regard to runway friction and contaminant drag and therefore to the achievable performance and control of the aeroplane during take-off or landing, since the actual conditions may not completely match the assumptions on which the performance information is based. In the case of a contaminated runway, the first option for the pilot-in-command is to wait until the runway is cleared. If this is impracticable, he or she he/she may consider a take-off or landing, provided that he or she he/she has applied the applicable performance adjustments, and any further safety measures he or she he/she considers justified under the prevailing conditions. The excess runway length available including the criticality of the overrun area should also be considered.

The determination of take-off performance data for wet and contaminated runways should be based on the reported runway surface condition in terms of contaminant and depth.

GM1 SPO.POL.140 Landing — complex motor-powered aeroplanes

WET AND CONTAMINATED RUNWAY DATA

The determination of landing performance data should be based on information provided in the OM on the reported RWYCC. The RWYCC is determined by the aerodrome operator using the RCAM and associated procedures defined in ICAO Doc 9981 'PANS Aerodromes'. The RWYCC is reported through an RCR in the SNOWTAM format in accordance with ICAO Annex 15.

AMC1 SPO.IDE.A.105 Minimum equipment for flight

MANAGEMENT OF THE STATUS OF CERTAIN INSTRUMENTS, EQUIPMENT OR FUNCTIONS

The operator should control and retain the status of the instruments, equipment or functions required for the intended operation, that are not controlled for the purpose of continuing airworthiness management.

GM1 SPO.IDE.A.105 Minimum equipment for flight

MANAGEMENT OF THE STATUS OF CERTAIN INSTRUMENTS, EQUIPMENT OR FUNCTIONS

- (a) The operator should define responsibilities and procedures to retain and control the status of instruments, equipment or functions required for the intended operation, that are not controlled for the purpose of continuing airworthiness management.
- (b) Examples of such instruments, equipment or functions may be, but are not limited to, equipment related to navigation approvals as FM immunity or certain software versions.

AMC2 SPO.IDE.A.145 Flight data recorder

[...]

Table 1: FDR — All aeroplanes

[...]

2	Pressure altitude (including altitude values displayed on each flight crew member's primary flight display, unless the aeroplane is type certified before 1 January 2023 and recording the values displayed at the captain position or the first officer position would require extensive modification)
3	Indicated airspeed or calibrated airspeed (including values of indicated airspeed or calibrated airspeed displayed on each flight crew member's primary flight display, unless the aeroplane is type certified before 1 January 2023 and recording the values displayed at the captain position or the first officer position would require extensive modification)

AMC1 SPO.IDE.A.146 Lightweight flight recorder

OPERATIONAL PERFORMANCE REQUIREMENTS

(a) If the flight recorder records flight data, it should record at least the following parameters:

- (1) relative time count,
- (2) pitch attitude or pitch rate,
- (3) roll attitude or roll rate,
- (4) heading (magnetic or true) or yaw rate,
- (5) latitude,
- (6) longitude,
- (7) positioning system: estimated error (if available),
- (8) pressure altitude or altitude from a positioning system,
- (9) time,
- (10) ground speed,
- (11) positioning system: track (if available),
- (12) normal acceleration,
- (13) longitudinal acceleration,
- (14) lateral acceleration.

(b) If the flight recorder records images, it should capture views of the main instrument displays at the pilot station, or at both pilot stations when the aeroplane is certified for operation with a minimum

crew of two pilots. The recorded image quality should allow reading the following indications during most of the flight:

- (1) magnetic heading,
- (2) time,
- (3) pressure altitude,
- (4) indicated airspeed,
- (5) vertical speed,
- (6) turn and slip,
- (7) attitude,
- (8) Mach number (if displayed),
- (9) stabilised heading, and
- (10) tachometer indication or equivalent indication of propulsive thrust or power.

- (c) If the flight recorder records a combination of images and flight data, each flight parameter listed in (a) should be recorded as flight data or by means of images.
- (d) The flight parameters listed in (a), which are recorded as flight data, should meet the performance specifications (range, sampling intervals, accuracy limits and resolution in read-out) as defined in the relevant table of EUROCAE Document ED-112 'Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems', dated March 2003, or EUROCAE Document ED-155 'Minimum Operational Performance Specification for Lightweight Flight Recording Systems', dated July 2009, or any later equivalent standard accepted by EASA.
- (e) The operational performance requirements for the flight recorder should be those laid down in:
 - (1) EUROCAE Document ED-155 or any later equivalent standard accepted by EASA for lightweight flight recorders; or
 - (2) EUROCAE Document ED-112 or any later equivalent standard accepted by EASA for crash-protected flight recorders.

GM1 SPO.IDE.A.146 Lightweight flight recorder

ADDITIONAL USEFUL INFORMATION

- (a) Experience has shown the usefulness, for analysing incidents and for training purposes, of recording additional information. In particular, cockpit audio and information on the handling of the aircraft (such as position of flight controls, position of engine controls, fuel and oil indications, aircraft configuration selection), and an external view are very useful for such purposes. To capture such information, simple equipment such as an integrated microphone and integrated camera may be sufficient.
- (b) If the flight recorder includes optional capabilities such as described in (a), their recording duration is recommended to be at least 2 hours.
- (c) If the flight recorder is capable of acquiring flight parameters from some aircraft system, it is advised to give priority to the flight parameters listed in Annex II-B to EUROCAE Document ED-155 or the flight

parameters listed in Annex II-A to EUROCAE Document ED-112. Indeed, these flight parameters were selected based on their relevance in many safety investigations.

GM2 SPO.IDE.A.146 Lightweight flight recorder

INSTALLATION OF CAMERAS

When cameras are installed for the purpose of SPO.IDE.A.146, it is advised to install them so that they do not capture images of head and shoulders of the flight crew members whilst seated in their normal operating position.

GM3 SPO.IDE.A.146 Lightweight flight recorder

RECORDING ACCURACY OF ATTITUDE RATE PARAMETERS

In the case of attitude rate parameters (pitch rate parameter, yaw rate parameter, roll rate parameter), the accuracy limit specified in EUROCAE Document ED-155, dated July 2009, was found to be unclear. Therefore, the following additional guidance is provided:

- (a) If the attitude rate parameter is provided by an approved system of the aeroplane, accuracy greater than as provided by this system is not expected for this attitude rate parameter.
- (b) If the attitude rate parameter is provided by a dedicated gyroscope, it is advisable that the gyroscope meets the following performance:
 - (1) errors caused by linear accelerations less than $\pm 3^\circ/\text{sec}$ (equivalent to $\pm 1\%$ of $300^\circ/\text{sec}$ recording range) for all combinations of parameter values and linear acceleration values in the respective ranges $[-300^\circ/\text{sec}; +300^\circ/\text{sec}]$ and $[-3g; +6g]$;
 - (2) errors caused by temperature less than $\pm 5^\circ/\text{sec}$ for all combinations of parameter values and temperature values in the respective ranges $[-300^\circ/\text{sec}; +300^\circ/\text{sec}]$ and $[-40^\circ\text{C}; +85^\circ\text{C}]$;
 - (3) angular random walk of the gyroscope equal to or less than $2^\circ/\sqrt{\text{hour}}$; and
 - (4) bias stability of the gyroscope significantly less than $360^\circ/\text{hour}$ (for instance, $50^\circ/\text{hour}$).

GM1 SPO.IDE.A.146(e) Lightweight flight recorder

FUNCTION TO MODIFY IMAGE AND AUDIO RECORDINGS

The purpose of the function modifying image and audio recordings is to allow the flight crew to protect their privacy by making such recordings inaccessible using normal techniques. The activation of this function is subject to the approval of the pilot-in-command (refer to SPO.GEN.107). However, the equipment manufacturer or a safety investigation authority might still be able to retrieve these recordings using special techniques.

AMC1 SPO.IDE.A.165 First-aid kit

CONTENT OF FIRST-AID KITS — OTHER-THAN COMPLEX MOTOR-POWERED AEROPLANES

- (a) First-aid kits (FAKs) should be equipped with appropriate and sufficient medications and instrumentation. However, these kits should be ~~amended~~ supplemented by the operator according to the characteristics of the operation (scope of operation, flight duration, number and demographics of passengers, etc.).
- (b) The following should be included in the FAKs:
- (1) bandages (assorted sizes, including a triangular bandage),
[...]
 - (6) safety scissors, ~~and~~
 - (7) disposable gloves;
 - (8) disposable resuscitation aid, and
 - (9) surgical masks.

AMC2 SPO.IDE.A.165 First-aid kit

CONTENT OF FIRST-AID KITS — COMPLEX MOTOR-POWERED AEROPLANES

- (a) First-aid kits should be equipped with appropriate and sufficient medications and instrumentation. However, these kits should be ~~amended~~ supplemented by the operator according to the characteristics of the operation (scope of operation, flight duration, number and demographics of passengers, etc.).
- (b) The following should be included in the FAKs:
- (1) Equipment
 - (i) bandages (assorted sizes, including a triangular bandage);
[...]
 - (xii) tweezers: splinter; ~~and~~
 - (xiii) thermometers (non-mercury); ~~and~~
 - (xiv) surgical masks.
 - (2) Medications
 - (i) simple analgesic ~~(may include liquid form)~~;
 - (ii) antiemetic — non-injectable;
[...]
 - (3) Other ~~content~~. The operator should make the instructions readily available. If an electronic format is available, then all instructions should be kept on the same device. If a paper format is used, then the instructions should be kept in the same kit with the applicable equipment and medication. The instructions should include, as a minimum, the following:

- (i) [...]
 - (iii) Basic life support instructions cards (summarising and depicting the current algorithm for basic life support);
 - ~~(iii)~~(iv) medical incident report form;
 - ~~(iv)~~(v) biohazard disposal bags; and
 - (vi) bag-valve masks for adults.
- (4) Additional equipment. The operators should carry additional equipment based on a risk assessment that considers the specificities and the nature of their specialised operations:
- (i) automated external defibrillator (AED);
 - (ii) suitable airway management device (e.g. supraglottic airway devices, oropharyngeal or nasopharyngeal airways); and
 - (iii) eye irrigator.

GM1 SPO.IDE.A.165 First-aid kit

LOCATION

The location of the first-aid kit in the cabin is normally indicated using internationally recognisable signs.

GM2 SPO.IDE.A.165 First-aid kit

storage

As a best practice and wherever practicable, the emergency medical equipment listed under AMC2 SPO.IDE.A.165 should be kept close together.

GM3 SPO.IDE.A.165 First-aid kit

CONTENT OF FIRST-AID KITS

The operator may supplement first-aid kits according to the characteristics of the operation based on a risk assessment. The assessment does not require an approval by the competent authority.

GM4 SPO.IDE.A.165 First-aid kit

LITHIUM BATTERIES

Risks related to the presence of lithium batteries should be assessed. All equipment powered by lithium batteries carried on an aeroplane should comply with the provisions of AMC1 CAT.GEN.MPA.140(f) including applicable technical standards such as (E)TSO-C142.

AMC1 SPO.IDE.A.215 & SPO.IDE.A.220 Radio communication equipment & Navigation equipment

PERFORMANCE-BASED COMMUNICATION AND SURVEILLANCE (PBCS) OPERATIONS

For operations in airspaces where required communication performance (RCP) and required surveillance performance (RSP) for PBCS have been prescribed, the operator should:

- (a) ensure that communication and surveillance equipment meet the prescribed RCP and RSP specifications respectively, as shown by an AFM statement or equivalent.
- (b) ensure that operational constraints are reflected in the MEL;
- (c) establish and include in the OM:
 - (1) normal, abnormal and contingency procedures;
 - (2) the flight crew qualification and proficiency constraints; and
 - (3) a training programme for relevant personnel consistent with the intended operations;
- (d) ensure continued airworthiness of the communication equipment and surveillance equipment in accordance with the appropriate RCP and RSP specifications respectively;
- (e) ensure that the contracted communication service provider (CSP) for the airspace being flown complies with the required RCP and RSP specifications as well as monitoring, recording and notification requirements; and
- (f) participate to monitoring programmes established in the airspace being flown in order to:
 - (1) submit the relevant reports of observed communication and surveillance performance respectively; and
 - (2) establish a process for immediate corrective action in case a non-compliance with the appropriate RCP or RSP specifications is detected.

GM1 SPO.IDE.A.215 & SPO.IDE.A.220 Radio communication equipment & Navigation equipment

PBCS OPERATIONS — GENERAL

Detailed guidance material on PBCS operations may be found in the following documents:

- (a) ICAO Doc 9869 'Performance-based Communication and Surveillance (PBCS) Manual'
- (b) ICAO Doc 10037 'Global Operational Data Link (GOLD) Manual'

PBCS OPERATIONS — AIRCRAFT ELIGIBILITY

- (a) The aircraft eligibility for compliance with the required RCP/RSP specifications should be demonstrated by the aircraft manufacturer or equipment supplier and be specific to each individual aircraft or the combination of the aircraft type and the equipment. The demonstrated compliance with specific RCP/RSP specifications may be documented in one of the following documents:
 - (1) the type certificate (TC);
 - (2) the supplemental type certificate (STC);
 - (3) the aeroplane flight manual (AFM) or AFM Supplement; or

- (4) a compliance statement from the manufacturer or the holder of the design approval of the data link installation, approved by the State of Design.
- (b) In addition to the indication of compliance with specific RCP/RSP specifications, the aircraft manufacturer or equipment supplier should document any associated operating limitations, information and procedures in the AFM or other appropriate documents.

PBCS OPERATIONS — MEL ENTRIES

- (a) The operator should amend the MEL, in accordance with the items identified by the aircraft manufacturer or equipment supplier in the master minimum equipment list (MMEL) or MMEL supplement, in relation to PBCS capability, to address the impact of losing an associated system/sub-system on data link operational capability.
- (b) As an example, equipment required in current FANS 1/A-capable aircraft, potentially affecting RCP and RSP capabilities, may be the following:
 - (1) VHF, SATCOM, or HFDL1 radios, as applicable;
 - (2) ACARS management unit (MU)/communications management unit (CMU);
 - (3) flight management computer (FMC) integration; and
 - (4) printer, if procedures require its use.

PBCS OPERATIONS — OPERATING PROCEDURES

The operator should establish operating procedures for the flight crew and other relevant personnel, such as but not limited to, flight dispatchers and maintenance personnel. These procedures should cover the usage of PBCS-relevant systems and include as a minimum:

- (a) pre-flight planning requirements including MEL consideration and flight plan filing;
- (b) actions to be taken in the data link operation, to include specific RCP/RSP required cases;
- (c) actions to be taken for the loss of data link capability while in and prior to entering the airspace requiring specific RCP/RSP specifications. Examples may be found in ICAO Doc 10037;
- (d) problem reporting procedures to the local/regional PBCS monitoring body or central reporting body as applicable; and
- (e) compliance with specific regional requirements and procedures, if applicable.

PBCS OPERATIONS — QUALIFICATION AND TRAINING

- (a) The operator should ensure that flight crew and other relevant personnel such as flight dispatchers and maintenance personnel are proficient with PBCS operations. A separate training programme is not required if data link communication is integrated in the current training programme. However, the operator should ensure that the existing training programme incorporates a basic PBCS concept and requirements for flight crew and other personnel that have direct impact on overall data link performance required for the provisions of ATS such as reduced separation.
- (b) The elements covered during the training should be as a minimum:
 - (1) Flight crew
 - (i) Data link communication system theory relevant to operational use;
 - (ii) AFM limitations;
 - (iii) Normal pilot response to data link communication messages;

- (iv) Message elements in the message set used in each environment;
- (v) RCP/RSP specifications and their performance requirements;
- (vi) Implementation of performance-based reduced separation with associated RCP/RSP specifications or other possible performance requirements associated with their routes;
- (vii) Other ATM operations involving data link communication services;
- (viii) Normal, non-normal and contingency procedures; and
- (ix) Data link communication failure/problem and reporting.

Note (1) If flight crew has already been trained on data link operations, additional training only on PBCS is required, addressing a basic concept and requirements that have direct impact on overall data link performance required for provisions of ATS (e.g. reduced separation).

Note (2) Training may be provided through training material and other means that simulate the functionality.

(2) Dispatchers/flight operations officers

- (i) Proper use of data link and PBCS flight plan designators;
- (ii) Air traffic service provider's separation criteria and procedures relevant to RCP/RSP specifications;
- (iii) MEL remarks or exceptions based on data link communication;
- (iv) Procedures for transitioning to voice communication and other contingency procedures related to the operation in the event of abnormal behavior of the data link communication;
- (v) Coordination with the ATS unit related to, or following a special data link communication exceptional event (e.g. log-on or connection failures); and
- (vi) Contingency procedures to transition to a different separation standard when data link communication fails.

(3) Engineering and maintenance personnel

- (i) Data link communication equipment including its installation, maintenance and modification;
- (ii) MEL relief and procedures for return to service authorisations; and
- (iii) Correction of reported non-performance of data link system.

PBCS OPERATIONS — CONTINUED AIRWORTHINESS

- (a) The operator should ensure that aircraft systems are properly maintained to continue to meet the applicable RCP/RSP specifications.
- (b) The operator should ensure that the following elements are documented and managed appropriately:
 - (1) configuration and equipment list detailing the pertinent hardware and software components for the aircraft/fleet(s) applicable to the specific RCP/RSP operation;
 - (2) configuration control for subnetwork, communication media and routing policies; and
 - (3) description of systems including display and alerting functions (including message sets).

PBCS OPERATIONS — CSP COMPLIANCE

- (a) The operator should ensure that their contracted CSPs notify the ATS units of any failure condition that may have an impact on PBCS operations. Notification should be made to all relevant ATS units regardless of whether the CSP has a contract with them.
- (b) The operator may demonstrate the compliance of their contracted CSP through service level agreements (SLAs)/contractual arrangements for data link services or through a joint agreement among PBCS stakeholders such as a Memorandum of Understanding (MOU) or a PBCS Charter.

PBCS OPERATIONS — PBCS CHARTER

A PBCS charter has been developed by PBCS stakeholders and is available as an alternative to SLAs in order to validate the agreement between the operator and the CSP for compliance with RCP/RSP required for PBCS operations. The charter is hosted on the website www.FANS-CRA.com where operators and CSPs can subscribe.

PBCS OPERATIONS — PARTICIPATION IN MONITORING PROGRAMMES

- (a) The operator should establish a process to participate in local or regional PBCS monitoring programmes and provide the following information, including any subsequent changes, to monitoring bodies:
 - (1) operator name;
 - (2) operator contact details; and
 - (3) other coordination information as applicable, including appropriate information means for the CSP/SSP service fail notification.
- (b) The process should also address the actions to be taken with respect to problem reporting and resolution of deficiencies, such as:
 - (1) reporting problems identified by the flight crew or other personnel to the PBCS monitoring bodies associated with the route of flight on which the problem occurred
 - (2) disclosing operational data in a timely manner to the appropriate PBCS monitoring bodies when requested for the purposes of investigating a reported problem
 - (3) investigating and resolving the cause of the deficiencies reported by the PBCS monitoring bodies.

AMC1 SPO.IDE.H.105 Minimum equipment for flight

MANAGEMENT OF THE STATUS OF CERTAIN INSTRUMENTS, EQUIPMENT OR FUNCTIONS

The operator should control and retain the status of the instruments, equipment or functions required for the intended operation, that are not controlled for the purpose of continuing airworthiness management.

GM1 SPO.IDE.H.105 Minimum equipment for flight

MANAGEMENT OF THE STATUS OF CERTAIN INSTRUMENTS, EQUIPMENT OR FUNCTIONS

- (a) The operator should define responsibilities and procedures to retain and control the status of instruments, equipment or functions required for the intended operation, that are not controlled for the purpose of continuing airworthiness management.
- (b) Examples of such instruments, equipment or functions may be, but are not limited to, equipment related to navigation approvals as FM immunity or certain software versions.

AMC1 SPO.IDE.H.146 Lightweight flight recorder

OPERATIONAL PERFORMANCE REQUIREMENTS

- (a) If the flight recorder records flight data, it should record at least the following parameters:
 - (1) relative time count,
 - (2) pitch attitude or pitch rate,
 - (3) roll attitude or roll rate,
 - (4) heading (magnetic or true) or yaw rate,
 - (5) latitude,
 - (6) longitude,
 - (7) positioning system: estimated error (if available),
 - (8) pressure altitude or altitude from a positioning system,
 - (9) time,
 - (10) ground speed,
 - (11) positioning system: track (if available),
 - (12) normal acceleration,
 - (13) longitudinal acceleration, and
 - (14) lateral acceleration.
- (b) If the flight recorder records images, it should capture views of the main instrument displays at the pilot station, or at both pilot stations when the helicopter is certified for operation with a minimum

crew of two pilots. The recorded image quality should allow reading the following indications during most of the flight:

- (1) magnetic or true heading,
- (2) time (if presented on the front instrument panel),
- (3) pressure altitude,
- (4) indicated airspeed,
- (5) vertical speed,
- (6) slip,
- (7) OAT,
- (8) attitude (if displayed),
- (9) stabilised heading (if displayed), and
- (10) main rotor speed.

- (c) If the flight recorder records a combination of images and flight data, each flight parameter listed in (a) should be recorded as flight data or by means of images.
- (d) The flight parameters listed in (a), which are recorded as flight data, should meet the performance specifications (range, sampling intervals, accuracy limits and resolution in read-out) as defined in the relevant table of EUROCAE Document ED-112 'Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems', dated March 2003, or EUROCAE Document ED-155 'Minimum Operational Performance Specification for Lightweight Flight Recording Systems', dated July 2009, or any later equivalent standard accepted by EASA.
- (e) The operational performance requirements for the flight recorder should be those laid down in:
 - (1) EUROCAE Document ED-155 or any later equivalent standard accepted by EASA for lightweight flight recorders; or
 - (2) EUROCAE Document ED-112 or any later equivalent standard accepted by EASA for crash-protected flight recorders.

GM1 SPO.IDE.H.146 Lightweight flight recorder

ADDITIONAL USEFUL INFORMATION

Refer to GM1 SPO.IDE.A.146.

GM2 SPO.IDE.H.146 Lightweight flight recorder

INSTALLATION OF CAMERAS

Refer to GM2 SPO.IDE.A.146.

GM3 SPO.IDE.H.146 Lightweight flight recorder**RECORDING ACCURACY OF ATTITUDE RATE PARAMETERS**

Refer to GM3 SPO.IDE.A.146.

GM1 SPO.IDE.H.146(e) Lightweight flight recorder**FUNCTION TO MODIFY IMAGE AND AUDIO RECORDINGS**

Refer to GM1 SPO.IDE.A.146(e).

AMC1 SPO.IDE.H.165 First-aid kit**CONTENT OF FIRST-AID KITS — OTHER-THAN COMPLEX MOTOR-POWERED HELICOPTERS**

- (a) First-aid kits should be equipped with appropriate and sufficient medications and instrumentation. However, these kits should be ~~amended~~supplemented by the operator according to the characteristics of the operation (scope of operation, flight duration, number and demographics of persons on board, etc.).
- (b) The following should be included in the FAKs:
- (1) bandages (assorted sizes, including a triangular bandage),
 - [...]
 - (6) safety scissors, ~~and~~
 - (7) disposable gloves,
 - (8) disposable resuscitation aid, and
 - (9) surgical masks.

AMC2 SPO.IDE.H.165 First-aid kit**CONTENT OF FIRST-AID KITS — COMPLEX MOTOR-POWERED HELICOPTERS**

- (a) First-aid kits should be equipped with appropriate and sufficient medications and instrumentation. However, these kits should be ~~amended~~supplemented by the operator according to the characteristics of the operation (scope of operation, flight duration, number and demographics of persons on board, etc.).
- (b) The following should be included in the FAKs:
- (1) Equipment
 - (i) bandages (assorted sizes, including a triangular bandage);
 - [...]
 - (xii) tweezers: splinter; ~~and~~
 - (xiii) thermometers (non-mercury); and

- (xiv) surgical masks.
- (2) Medications
 - (i) simple analgesic ~~(may include liquid form)~~;
 - (ii) antiemetic — non-injectable;
 - [...]
- (3) Other content. The operator should make available instructions either in a paper-based or an electronic format. If an electronic format is available, then all instructions should be kept on the same device. If a paper format is used, then the instructions should be kept in the same kit with the applicable equipment and medication. The instructions should include, as a minimum, the following:
 - (i) [...]
 - (ii) first-aid handbook, current edition;
 - (iii) Basic life support instructions cards (summarising and depicting the current algorithm for basic life support);
 - ~~(iii)~~(iv) medical incident report form; ~~and~~
 - (iv) biohazard disposal bags; and
 - (vi) bag-valve masks for adults.
- (4) Additional equipment. The operators should carry additional equipment based on an assessment that considers the specificities and the nature of their specialised operations:
 - (i) automated external defibrillator (AED);
 - (ii) suitable airway management device (e.g. supraglottic airway devices, oropharyngeal and nasopharyngeal airways); and
 - (iii) eye irrigator.

GM1 SPO.IDE.H.165 First-aid kit

LOCATION AND USE

The location of the first-aid kit is normally indicated using internationally recognisable signs.

The first-aid kit 'should be readily accessible for use' in helicopter operations should be understood as the first-aid kit being either accessible in flight or immediately after landing.

In some operations it is not practicable to use the first-aid kit during flight. Therefore, the first-aid kit can be carried in the cargo compartment, where it will be easily accessible for use as soon as the aircraft has landed, when the following conditions are met:

- (a) precautionary landing sites are available;
- (b) the lack of cabin space is such that movement or use of the first-aid kit is impaired; and
- (c) the installation of the first-aid kit in the cabin is not practicable.

GM2 SPO.IDE.H.165 First-aid kit

STORAGE

As a best practice and wherever practicable, the emergency medical equipment listed under AMC2 SPO.IDE.H.165 should be kept close together.

GM3 SPO.IDE.H.165 First-aid kit

CONTENT OF FIRST-AID KITS

The operator may supplement first-aid kits according to the characteristics of the operation based on a risk assessment. The assessment does not require an approval by the competent authority.

GM4 SPO.IDE.H.165 First-aid kit

LITHIUM BATTERIES

Risks related to the presence of lithium batteries should be assessed. All equipment powered by lithium batteries carried on an aeroplane should comply with the provisions of AMC1 CAT.GEN.MPA.140(f) including applicable technical standards such as (E)TSO-C142.