



Initial Airworthiness Special Condition

Lightweight Flight Recorders

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SUBJECT : Lightweight Flight Recorders
REQUIREMENTS incl. Amdt. : CS 23.2555 at Amdt. 5
ASSOCIATED IM/MoC¹ : Yes / No *[Delete last page of associated IM/MoC if not applicable]*
ADVISORY MATERIAL :

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¹ Associated Interpretative Material and/or Means of Compliance may be published for awareness only and they are not subject to public consultation.

INTRODUCTORY NOTE:

The following Special Condition (SC) has been classified as important and as such shall be subject to public consultation in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) which states:

"2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency."

ABBREVIATIONS:

IDENTIFICATION OF ISSUE:

This SC is applicable to CS 23 aircraft installing a lightweight flight recorder to comply with the requirements of <CAT.IDE.A.191> of Part-CAT and point <SPO.IDE.A.146> of Part-SPO, introduced in the Air OPS rules through Commission Implementing Regulation (EU) 2019/1387 dated 01 August 2019 that introduces the obligation to install a flight recorder on new aircraft and that such installations must take into consideration the the size and complexity of such aircraft and the type of operation. In this context, the concept of 'flight recorder' has been extended to in-flight recording equipment for light aircraft. The new concept of flight recorders now encompasses 'crash-protected' flight recorders and 'lightweight' flight recorders. A lightweight flight recorder is designed to meet less demanding crash-protection requirements. Additionally, <CAT.IDE.A.191> of Part-CAT and point <SPO.IDE.A.146> of Part-SPO requires that the flight recorder shall record, by means of flight data or images, information that is sufficient to determine the flight path and aircraft speed.

The current requirements of CS 23.2555 do not cover the installation of lightweight flight recorders. Considering all the above, the following Special Condition is proposed (NPA 2022-01 was already published to address this issue in CS27/29 aircraft and the related proposed AMC has been considered to develop the MOC in this consultation paper).

Appendix A - SC-F23.2555-01**Special Condition****Lightweight flight recorder****1. APPLICABILITY**

This SC is applicable to CS23 aircraft that install a lightweight flight recorder required to comply with the requirements of <CAT.IDE.A.191> of Part-CAT and point <SPO.IDE.A.146> of Part-SPO, introduced in the Air OPS rules through Commission Implementing Regulation (EU) 2019/1387 dated 01 August 2019.

1.1 RELATED CS

CS 23.2555 (a)(b)(c)(d) at Amendment 5.

2. SPECIAL CONDITION

For the installation of a lightweight flight recorder the design shall comply with the following special detailed technical specifications, and CS 23.2555 is to be replaced by the following:

If recording is required by the operating rules, the lightweight flight recorder shall:

- a) be installed so as to ensure accurate and intelligible recording and safeguarding of the required data, also in conditions encountered during crash or fire;
- b) be powered by a power source that provides the proper and reliable functioning of the lightweight recorder throughout the aeroplane operating environment;
- c) include features to facilitate the localisation of a memory medium after an accident; and
- d) be installed such that it automatically records when the aeroplane is capable of moving under its own power.

Appendix B - Associated Means of Compliance

The associated Means of Compliance is published for awareness only and is not subject to public consultation.

(a) Each lightweight flight recorder required by the applicable operating rules should be approved and should be installed so that:

- (1) there is an aural or visual means for pre-flight checking of the recorder for proper recording of data in the storage medium; and
- (2) it automatically starts to record prior to the aircraft being capable of moving under its own power and automatically stops to record after the aircraft is no longer capable of moving under its own power.

(b) The container of the recording medium should be located and mounted so as to reduce the probability of the container rupturing or the recording medium being destroyed as a result of impact with the Earth's surface and subsequent heat damage caused by a post-impact fire, to an acceptable level.

(c) Installation of the flight recorder system

'Flight recorder system' refers to the lightweight flight recorder and its dedicated equipment. It may include the following items as appropriate to the aircraft:

- (1) The equipment necessary to:
 - (i) acquire and process sensor signals;
 - (ii) store the recorded data in a robust recording medium; and
 - (iii) when necessary, support dedicated sensors; and
- (2) Digital data buses and/or networks providing communications between elements of the system.

The flight recorder system should be installed in accordance with EUROCAE Document ED-155 Section 2-5.3.

The recording medium container should be located and mounted in accordance with the specifications given in EUROCAE Document ED-155 Sections 2-5.4 and 2-5.5.

(d) The lightweight flight recorder installed to meet the Special Condition should be granted an ETSO authorisation in accordance with the following ETSOs or be compliant with at least one of the following standards: ETSO-2C197, ETSO C124c, ETSO C176a (or equivalent standards accepted by EASA).

In showing compliance with Appendix A, the applicant should take into account EUROCAE Document ED-155 'MOPS for Lightweight Flight Recording Systems' or EUROCAE Document ED-112A 'MOPS for Crash Protected Airborne Recorder Systems' or later revisions of these documents.

(e) The lightweight flight recorder should receive its electric power from the bus that provides the maximum reliability for operation of the recorder without jeopardising supply to load circuits essential for safe operations.

(f) The recording medium container of the lightweight flight recorder in point (a) should:

- (1) have a high proportion of its outer surface area coloured in bright orange; and
- (2) have dimensions that are adequate for visually locating it on an accident scene.
- (3) have a height, width and depth that are at least 4 cm (1.5 inches).

(g) Each flight parameter to be recorded as required by the applicable operating rules should be recorded as digital data or by means of images.

(h) If the lightweight flight recorder in point (a) records a flight parameter as required by the applicable operating rules by means of images, the image source should be installed to provide images with a quality sufficient for reading the values of this flight parameter during all phases of the flight.

(i) If the lightweight flight recorder in point (a) records images or audio of the flight crew area:

- (1) an 'erase function' should be provided, which can be operated by the commander and which modifies image and audio recordings made before the operation of that function, so that those recordings cannot be retrieved using normal replay or copying techniques; and
- (2) the probability of inadvertent operation of the erase function and the probability of actuation of that function during crash impact should be minimised.
- (3) Image and audio recordings of the flight crew area

If there are no compartments to physically segregate the flight crew from the passengers, the term 'flight crew area' in this associated means of compliance should be understood as the area including:

- * the flight crew seat(s),
- * windshield and windows used by the flight crew to get an external view while seated,
- * aircraft instruments and controls, and
- * circuit breakers accessible by the flight crew while seated.

(j) Evaluation of recordings

The following acceptable means of compliance with the Special Condition is provided to demonstrate that the performance of the installed flight recorder system is acceptable with regard to data recording.

Inspections of the recordings that are part of the instructions for continued airworthiness are not within the scope of this paragraph.

(1) A recording made during a flight should be evaluated to confirm that the recording of the data required by Regulation (EU) No 965/2012 is acceptable during all phases of flight where this data should be recorded. In the case of image recordings, refer to Section III-6.4 of ED-155.

(2) The evaluation of the recordings from the flight should include:

- (i) checking the correct functioning of the automatic start-and-stop function of the flight recorder system; and
- (ii) if the recorder is fitted with a built-in-test feature, checking the absence of faults that may affect the performance of the recorder.

(3) The evaluation of the recordings should be documented in an evaluation report; and

(4) The performance of the flight recorder system with regard to data recording should be

considered to be acceptable only if points (i)(1) and (i)(2) of this AMC were satisfactorily addressed.

(5) It is accepted that by implementing emergency procedures (i.e. for smoke/fire isolation) the power supply to the lightweight recorder is cut-off.

(k) Instructions for continued airworthiness (ICA)

When developing the ICA for the flight recorder system, required by CS 23.2625, the applicant should address all the failures that may affect the performance of the flight recorder system or the quality of the data required to be recorded by the operating rules.

Examples of failures (indicative and non-exhaustive list):

- * Loss of the recording function of the lightweight flight recorder;
- * Any data required by the operating rules is missing, or is not correctly recorded;
- * Failure of the automatic start-and-stop function.

The ICA should include the procedures to be followed for retrieving the data required to be recorded by the lightweight flight recorder when it is undamaged.

In addition, if the lightweight flight recorder records some required flight parameters as digital data, the ICA should include a document that presents the information necessary to retrieve the raw binary data of these flight parameters from a recording file and to convert this data into engineering units and textual interpretations. If the lightweight flight recorder records some required flight parameters by means of images, the ICA should include a document that presents the information necessary to read the flight parameter values from the recorded images.