AMC 25.1460 Data link recorders

ED Decision 2020/024/R

1. General

The installation of a recorder with an ETSO authorisation against ETSO-C177a (or an equivalent standard accepted by EASA) satisfies the approval requirement in CS 25.1460(a).

In showing compliance with CS 25.1460, the applicant should take into account EUROCAE Document ED-112A, 'Minimum operational performance specification for crash protected airborne recorder systems', dated September 2013, or a later revision.

'DLR system' designates the data link recorder (DLR) and its dedicated equipment. It may include the following items as appropriate to the aircraft:

a. A crash-protected recorder.

b. Digital interface equipment suitable for converting a data link communication message into a format which is to be recorded.

c. Digital data busses and/or networks providing communications between elements of the system.

The data link recording function may be performed by:

a. a cockpit voice recorder;

b. a flight data recorder;

c. a flight data and cockpit voice combination recorder; or

d. a dedicated data link recorder.

2. Combination recorders

Refer to the Section of AMC 25.1457 titled 'Combination recorder'.

3. Recorded data

The recorded data should be sufficient to allow investigators, in the framework of an accident or incident investigation, to accurately reconstruct the sequence of data link communications between the aircraft and air traffic service units, other aircraft and other entities. For this purpose, the data link recording should comply with:

a. EUROCAE Document ED-93 (dated November 1998), 'Minimum aviation system performance specification for CNS/ATM message recording systems', Section 2.3.1, Choice of recording points, and Section 2.3.2, Choice of data to be recorded on board the aircraft; and

b. EUROCAE Document ED-112A (dated September 2013), 'Minimum operational specification for crash protected airborne recorder systems', Part IV, Chapter IV-2, Section IV-2.1.6, Data to be recorded.

4. Instructions for Continued Airworthiness (ICA)

When developing the ICA for the DLR system, as required by CS 25.1529 and Appendix H, the applicant should address all the failures that may affect the correct functioning of the DLR system or the integrity of the recorded information.

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

— Loss of the recording function or of the acquisition function of the DLR;

— Part of the data link communication (required by CS 25.1460(a) or by the applicable air operations regulations) is missing or corrupted;

— Failure of a means to facilitate the finding of the DLR recording medium after an accident (e.g. an underwater locating device or an emergency locator transmitter attached to the recorder);

— Failure of a means to detect a crash impact (for the purpose of stopping the recording after a crash impact, or for the purpose of deploying the recorder if it is deployable).

In addition, the ICA should include the following item, unless the applicant shows that this is not applicable:

Documentation to perform the following:

i. Convert the recorded data back to the original format of the data link communication messages,

ii. Retrieve the time and the priority of each recorded message, and

iii. Correlate the recorded messages with the FDR and CVR recordings.

[Amdt 25/26]

CS 25.1461 Equipment containing high-energy rotors

ED Decision 2003/2/RM

(a) Equipment containing high energy rotors must meet sub-paragraph (b), (c) or (d) of this paragraph.

(b) High energy rotors contained in equipment must be able to withstand damage caused by malfunctions, vibration, abnormal speeds, and abnormal temperatures. In addition –

(1) Auxiliary rotor cases must be able to contain damage caused by the failure of high energy rotor blades; and

(2) Equipment control devices, systems, and instrumentation must reasonably ensure that no operating limitations affecting the integrity of high-energy rotors will be exceeded in service.

(c) It must be shown by test that equipment containing high-energy rotors can contain any failure of a high-energy rotor that occurs at the highest speed obtainable with the normal speed control devices inoperative.

(d) Equipment containing high energy rotors must be located where rotor failure will neither endanger the occupants nor adversely affect continued safe flight.

SUBPART G – OPERATING LIMITATIONS AND INFORMATION

CS 25.1501 General

ED Decision 2013/010/R

(See AMC 25.1501)

(a) Each operating limitation specified in CS 25.1503 to 25.1533 and other limitations and information necessary for safe operation must be established.

(b) The operating limitations and other information necessary for safe operation must be made available to the crew members as prescribed in CS 25.1541 to CS 25.1593.

[Amdt 25/13]

AMC 25.1501 Operating Limitations and Information - General

ED Decision 2003/2/RM

The limitations and information established in accordance with Subpart G should be only those which are within the competence of the flight crew to observe, and should relate only to those situations (including pre- and post-flight) with which a flight crew member might reasonably be concerned.

OPERATING LIMITATIONS

CS 25.1503 Airspeed limitations: general

ED Decision 2003/2/RM

When airspeed limitations are a function of weight, weight distribution, altitude, or Mach number, limitations corresponding to each critical combination of these factors must be established.

CS 25.1505 Maximum operating limit speed

ED Decision 2003/2/RM

The maximum operating limit speed (V_{MO}/M_{MO}, airspeed or Mach number, whichever is critical at a particular altitude) is a speed that may not be deliberately exceeded in any regime of flight (climb, cruise, or descent), unless a higher speed is authorised for flight test or pilot training operations. V_{MO}/M_{MO} must be established so that it is not greater than the design cruising speed V_C and so that it is sufficiently below V_D/M_D or V_{DF}/M_{DF}, to make it highly improbable that the latter speeds will be inadvertently exceeded in operations. The speed margin between V_{MO}/M_{MO} and V_D/M_D or V_{DF}/M_{DF} may not be less than that determined under CS 25.335(b) or found necessary during the flight tests conducted under CS 25.253.

CS 25.1507 Manoeuvring speed

ED Decision 2003/2/RM

The manoeuvring speed must be established so that it does not exceed the design manoeuvring speed V_A determined under CS 25.335(c).

CS 25.1511 Flap extended speed

ED Decision 2003/2/RM

The established flap extended speed V_{FE} must be established so that it does not exceed the design flap speed V_F chosen under CS 25.335(e) and 25.345, for the corresponding wing-flap positions and engine powers.

CS 25.1513 Minimum control speed

ED Decision 2003/2/RM

The minimum control speed V_{MC} determined under CS 25.149 must be established as an operating limitation.

CS 25.1515 Landing gear speeds

ED Decision 2003/2/RM

(a) The established landing gear operating speed or speeds, V_{LO}, may not exceed the speed at which it is safe both to extend and to retract the landing gear, as determined under CS 25.729 or by the flight characteristics. If the extension speed is not the same as the retraction speed, the two speeds must be designated as $V_{LO(EXT)}$ and $V_{LO(RET)}$, respectively.

(b) The established landing gear extended speed V_{LE} may not exceed the speed at which it is safe to fly with the landing gear secured in the fully extended position, and that determined under CS 25.729.

CS 25.1516 Other speed limitations

ED Decision 2003/2/RM

Any other limitation associated with speed must be established.

CS 25.1517 Rough air speed, V_{RA}

ED Decision 2005/006/R

(a) A rough air speed, V_{RA} for use as the recommended turbulence penetration air speed, and a rough air Mach number M_{RA}, for use as the recommended turbulence penetration Mach number, must be established to ensure that likely speed variation during rough air encounters will not cause the overspeed warning to operate too frequently.

(b) At altitudes where V_{MO} is not limited by Mach number, in the absence of a rational investigation substantiating the use of other values, V_{RA} must be less than V_{MO} - 35 KTAS.

(c) At altitudes where V_{MO} is limited by Mach number, M_{RA} may be chosen to provide an optimum margin between low and high speed buffet boundaries.

[Amdt 25/1]

CS 25.1519 Weight, centre of gravity and weight distribution

ED Decision 2016/010/R

(See AMC 25.1519)

The aeroplane weight, centre of gravity, and weight distribution limitations determined under CS 25.23 to CS 25.27 must be established as operating limitations.

[Amdt 25/18]

AMC 25.1519 Weight, centre of gravity and weight distribution

ED Decision 2003/2/RM

A statement of the maximum certificated take-off and landing weights, and the minimum certificated take-off and landing weights, should be established, together with the maximum ramp or taxying weight, the maximum zero-fuel weight and any other fixed limit on weight, including weight limitations resulting from such factors as brake energy limits, tyre limits, etc., established in accordance with the airworthiness standards of CS-25. Any limitations on aeroplane loading associated with the stated weight limitations (e.g. fuel load and usage, maximum fuel for landing) should be considered.

CS 25.1521 Powerplant limitations

ED Decision 2015/008/R

(See AMC 25.1521)

(a) *General.* The powerplant limitations prescribed in this paragraph must be established so that they do not exceed the corresponding limits for which the engines or propellers are type certificated and do not exceed the values on which compliance with any other requirement of this Code is based.

(b) Reserved.

(c) *Turbine engine installations*. Operating limitations relating to the following must be established for turbine engine installations:

(1) Horsepower, torque or thrust, rpm, gas temperature, and time for –

(i) Maximum continuous power or thrust (relating to augmented or unaugmented operation as applicable).

(ii) Take-off power or thrust (relating to augmented or unaugmented operation as applicable).

(2) Fuel designation or specification.

(3) Maximum time interval between engine run-ups from idle, run-up power setting, duration at power, and the associated minimum ambient temperature, if any, demonstrated for the maximum time interval, for ground operation in icing conditions, as defined in CS 25.1093(b)(2).

(4) Any other parameter for which a limitation has been established as part of the engine type certificate except that a limitation need not be established for a parameter that cannot be exceeded during normal operation due to the design of the installation or to another established limitation.

(d) *Ambient temperature.* An ambient temperature limitation (including limitations for winterisation installations, if applicable) must be established as the maximum ambient atmospheric temperature established in accordance with CS 25.1043(b).

[Amdt 25/16]

AMC 25.1521 Power-plant limitations

ED Decision 2003/2/RM

1 In furnishing limitations, consideration should be given to the following. The list does not necessarily include all the items to be considered for a given aeroplane.

a. Rotational speeds.

b. Exhaust and/or turbine gas temperature.

c. Oil temperatures and pressures.

d. Fuel temperatures and pressures.

e. Water and/or water methanol usage.

f. Anti-icing.

g. Specifications of approved fuels, oils and additives.

2 Other parameters, e.g. time, altitude, ambient temperatures, airspeed, may be necessary in defining power-plant limitations.

3 All operating phases should be considered in establishing the power-plant limitations.

CS 25.1523 Minimum flight crew

ED Decision 2016/010/R

(See AMC 25.1523)

The minimum flight crew must be established (see AMC 25.1523) so that it is sufficient for safe operation, considering –

(a) The workload on individual crew members;

(b) The accessibility and ease of operation of necessary controls by the appropriate crew member; and

(c) The kind of operation authorised under CS 25.1525.

The criteria used in making the determinations required by this paragraph are set forth in Appendix D.

[Amdt 25/18]

AMC 25.1523 Minimum flight crew

ED Decision 2003/2/RM

1 Both the number and identity of the flight crew members should be established.

2 If the minimum flight crew varies with the kinds of operation to which the aeroplane is limited, the approved number and identity of the flight crew members should be stated for each kind of operation.

3 If a particular flight crew member's station has to be occupied at all material times, this should be stated when specifying the minimum flight crew.

CS 25.1525 Kinds of operation

ED Decision 2003/2/RM

The kinds of operation to which the aeroplane is limited are established by the category in which it is eligible for certification and by the installed equipment.

CS 25.1527 Ambient air temperature and operating altitude

ED Decision 2003/2/RM

The extremes of the ambient air temperature and operating altitude for which operation is allowed, as limited by flight, structural, powerplant, functional, or equipment characteristics, must be established.

CS 25.1529 Instructions for Continued Airworthiness

ED Decision 2003/2/RM

Instructions for Continued Airworthiness in accordance with Appendix H must be prepared.

CS 25.1531 Manoeuvring flight load factors

ED Decision 2003/2/RM

Load factor limitations, not exceeding the positive limit load factors determined from the manoeuvring diagram in CS 25.333(b), must be established.

CS 25.1533 Additional operating limitations

ED Decision 2016/010/R

(See AMC 25.1533)

(a) Additional operating limitations must be established as follows:

(1) The maximum take-off weights must be established as the weights at which compliance is shown with the applicable provisions of this CS-25 (including the take-off climb provisions of CS 25.121(a) to (c), for altitudes and ambient temperatures).

(2) The maximum landing weights must be established as the weights at which compliance is shown with the applicable provisions of this CS-25 (including the landing and approach climb provisions of CS 25.119 and 25.121(d) for altitudes and ambient temperatures).

(3) The minimum take-off distances must be established as the distances at which compliance is shown with the applicable provisions of this CS-25 (including the provisions of CS 25.109 and 25.113, for weights, altitudes, temperatures, wind components, runway surface conditions (dry and wet) and runway gradients) for smooth, hard-surfaced runways. Additionally, at the option of the applicant, wet runway take-off distances may be established for runway surfaces that have been grooved or treated with a porous friction course and may be approved for use on runways where such surfaces have been designed, constructed and maintained in a manner acceptable to the Agency. (See AMC 25.1533(a)(3).)

(b) The extremes for variable factors (such as altitude, temperature, wind, runway gradients) are those at which compliance with the applicable provisions of this CS-25 is shown.

(c) For aeroplanes certified in accordance with CS 25.1420(a)(1) or (a)(2), an operating limitation must be established to:

(1) Prohibit intentional flight, including take-off and landing, into icing conditions defined in Appendix O for which the aeroplane has not been certified to safely operate; and

(2) Require exiting all icing conditions if icing conditions defined in Appendix O are encountered for which the aeroplane has not been certified to safely operate.

[Amdt 25/16]
[Amdt 25/18]

AMC 25.1533(a)(3) Take-off distances on runways with a grooved or porous friction course surface

ED Decision 2003/2/RM

Runways that have a grooved or porous friction course (PFC) surface can maintain a significantly higher wheel-braking coefficient of friction when wet than can runways that lack such surface treatments. Where take-off distance information specifically applicable to such runways has been established, this higher level of friction has been taken into account in accordance with CS 25.109(d). It is therefore essential that such information is only approved for use on runways having a grooved or PFC surface that has been constructed and maintained to acceptable standards. FAA AC 150/532012B 'Measurement, Construction and Maintenance of Skid-Resistant Airport Paving Surfaces' provides guidance on such standards. Where such operational approval has not been obtained, the performance information applicable to a smooth, hard-surfaced runway must be used.

CS 25.1535 ETOPS Design approval

ED Decision 2018/005/R

For an aeroplane configuration to be capable of ETOPS, the following are required:

(a) Compliance with the requirements of CS-25 considering the maximum flight duration and the longest diversion time for which approval is being sought.

(b) For Early ETOPS, approval of the engine for ETOPS capability in compliance with CS-E 1040.

(c) Consideration must have been given to the crew workload and operational implications and the flight crew's and passengers' physiological needs of continued operations with failure effects for the longest diversion time for which approval is being sought.

(d) The appropriate capability and limitations must have been established. (See AMC 20-6.)

(See AMC 20-6)

[Amdt 25/10]
[Amdt 25/21]

MARKINGS AND PLACARDS

CS 25.1541 General

ED Decision 2003/2/RM

(See AMC 25.1541)

(a) The aeroplane must contain –

(1) The specified markings and placards; and

(2) Any additional information, instrument markings, and placards required for the safe operation if there are unusual design, operating, or handling characteristics.

(b) Each marking and placard prescribed in sub-paragraph (a) of this paragraph –

(1) Must be displayed in a conspicuous place; and

(2) May not be easily erased, disfigured, or obscured.

AMC 25.1541 Markings and placards — General

ED Decision 2021/015/R

Markings or placards should be placed close to or on (as appropriate) the instrument or control with which they are associated. The terminology and units used should be consistent with those used in the Flight Manual. The units used for markings and placards should be those that are read on the relevant associated instrument.

Publications which are considered to provide appropriate standards for the design substantiation and certification of symbolic placards may include, but are not limited to, 'General Aviation Manufacturers Association (GAMA) Publication No. 15 — Symbolic Messages', Initial Issue, 1 March 2014.

EASA accepts the relevant parts of Federal Aviation Administration (FAA) AC 25-17A 'Transport Airplane Cabin Interiors Crashworthiness Handbook', of 24 May 2016, as an acceptable means of compliance with CS 25.1541.

Note: 'relevant parts' means the AC 25-17A parts that address the applicable Federal Aviation Regulation (FAR)/CS-25 paragraph(s).

[Amdt 25/19]
[Amdt 25/27]

CS 25.1543 Instrument markings; general

ED Decision 2003/2/RM

(See AMC 25.1543)

For each instrument –

(a) When markings are on the cover glass of the instrument, there must be means to maintain the correct alignment of the glass cover with the face of the dial; and

(b) Each instrument marking must be clearly visible to the appropriate crew member.