European Union Aviation Safety Agency

Explanatory Note to Decision 2020/024/R

Installation and maintenance of recorders – certification aspects, Tyre pressure monitoring, Regular update of CS-25 'CS-25 Amendment 26'

RELATED NPA/CRD 2019-12 — RMT.0249, NPA/CRD 2020-05 — RMT.0586, NPA/CRD 2020-01 — RMT.0673

EXECUTIVE SUMMARY

The objective of this Decision is to:

1) improve the availability and the quality of data recorded by flight recorders in order to better support safety investigations of large aeroplane accidents and incidents;
2) decrease the risk of a hazardous or catastrophic tyre failure of a large aeroplane that is caused by inadequate tyre inflation pressure;
3) reflect the state of the art of large aeroplane certification and improve the harmonisation of CS-25 with the Federal Aviation Administration (FAA) regulations; and
4) make editorial corrections.

This Decision amends CS-25 to:

1) provide certification specifications (CS) and acceptable means of compliance (AMC) for flight recorders performing the data link recording function; introduce into AMCs for flight recorder installations new sections explaining the expectations in terms of instructions for continued airworthiness (ICA); introduce into AMC 25.1457 a new section explaining how to perform evaluations of cockpit voice recorder (CVR) recordings; and amend CS 25.1457 for CVRs to allow the use of more than four channels;
2) require a means to minimise the risk that a tyre is below its minimum serviceable inflation pressure during operation;
3) introduce amendments addressing various selected non-complex, non-controversial, and mature subjects: Go-around handling qualities and performance; Minimum control speeds; Fuel tank and system lightning protection; Cabin safety; Electronic AFMs – computation of misleading primary information; On-board weight and balance systems; Air conditioning systems; Flight guidance systems; Primary flight displays during unusual attitude and declutter modes; Lightning protection and electrical bonding and protection against static electricity; and Operation without normal electrical power; and
4) make editorial corrections in CS 25.807, Emergency exits.

The amendments are expected to increase safety without any significant economic impact, and with no environmental or social impact. This will also support large aeroplane operators in ensuring the serviceability of flight recorders, and streamline the CS-25 certification process, thereby providing an economic benefit for operators, CS-25 certification applicants, and EASA.

Action area:	Aircraft tracking, rescue operations and accident investigations; Design, production and maintenance improvements; Regular updates/review of rules		
Related rules:	CS-25		
Affected stakeholders:	Large aeroplanes manufacturers, large aeroplanes operators and maintenance organisations, accident investigation bodies		
Driver:	Safety; Efficiency/proportionality	**Rulemaking group:**	Yes for RMT.0586; No for RMT.0249 and RMT.0673
Impact assessment:	RMT.0249: yes RMT.0586: yes RMT.0673: no	**Rulemaking Procedure:**	Standard

RMT.0249: 27.1.2016	**13.11.2019**	**22.12.2020**
RMT.0586: 30.5.2017	**6.3.2020**	
RMT.0673: 'Regular update of CS-25'	**20.1.2019**	

Table of contents

1. About this Decision

The European Union Aviation Safety Agency (EASA) developed ED Decision 20XX/XXX/R in line with Regulation (EU) 2018/1139[1] ('Basic Regulation') and the Rulemaking Procedure[2].

This rulemaking activity is included in the European Plan for Aviation Safety (EPAS)[3] under Rulemaking Task (RMT).0249, RMT.0586, RMT.0673. The scope and timescales of the tasks were defined in the related Terms of Reference[4].

The draft text of this Decision has been developed by EASA, and based on the input of a Rulemaking Group (RMG) in the case of RMT.0586. All the interested parties were consulted through Notice of Proposed Amendment (NPA) 2019-12 (RMT.0249), 2020-05 (RMT.0586), and 2020-01 (RMT.0673)[5].

NPA 2019-12: 93 comments were received from all the interested parties, including industry, national aviation authorities, and social partners.

NPA 2020-05: 104 comments were received from all the interested parties, including industry, and national aviation authorities.

NPA 2020-01: 104 comments were received from all the interested parties, including industry, and national aviation authorities.

EASA reviewed the comments received during the public consultation. The comments received and EASA's responses to them are presented in Comment-Response Document (CRD) 2019-12, 2020-05, and 2020-01[6].

The final text of this Decision, with the certification specifications (CSs) and acceptable means of compliance (AMC), has been developed by EASA.

The major milestones of this rulemaking activity are presented on the title page.

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1 Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1535612134845&uri=CELEX:32018R1139).

2 EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure).

3 https://www.easa.europa.eu/document-library/general-publications?publication_type%5B%5D=2467

4 https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0249-mdm051
https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0586
https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0673

5 In accordance with Article 115 of Regulation (EU) 2018/1139 and Articles 6(3) and 7 of the Rulemaking Procedure.

6 https://www.easa.europa.eu/document-library/comment-response-documents

2. In summary — why and what

2.1. Why we need to change the CS/AMC & GM

RMT.0249: Installation and maintenance of recorders – certification aspects

Data link recording:

Annex IV (Part-CAT) to Commission Regulation (EU) No 965/2012 on air operations contains requirements on the recording of data link messages on a flight recorder for aircraft manufactured since April 2014 and under certain conditions (point CAT.IDE.A.195).

However, there are no corresponding certification specifications for the installation of a data link recording function in CS-25. As a temporary measure, EASA developed a generic certification review item (CRI) on the subject 'flight recorders and data link recording'.

The serviceability of flight recorders:

Maintenance instructions

Safety investigation authorities have reported several cases in which the FDR or the cockpit voice recorder (CVR) did not correctly record data due to a malfunction of the unit or of the dedicated equipment (including sensors and transducers). Such failures may remain hidden for a certain amount of time, as the serviceability of flight recorders encompasses the quality of the recorded data, which cannot currently be automatically assessed.

Part-CAT of Regulation (EU) No 965/2012 on air operations requires (CAT.GEN.MPA.195(b)) aircraft operators to conduct operational checks and evaluations of recordings of flight recorders in order to ensure their 'continued serviceability'. Consistently with the standards in ICAO Annex 6, Part I, Appendix 8, and in ICAO Annex 6, Part III, Appendix 4, AMC1 CAT.GEN.MPA.195(b) recommends several scheduled tasks to comply with this requirement.

In practice, the content and the level of detail of the maintenance instructions for a flight recorder system vary from one installation to another, resulting in inconsistent maintenance practices among aircraft operators.

Conversion of FDR raw data into flight parameters expressed in engineering units

Safety investigation authorities also found various cases where the information necessary to convert the FDR raw data into parameters expressed in engineering units, as provided by the type certificate (TC) or supplemental type certificate (STC) holder, was incomplete or inaccurate. As a result, the analysis of the FDR data was significantly delayed. Point (d) of CAT.GEN.MPA.195 requires the aircraft operator to 'keep and maintain up-to-date documentation that presents the necessary information to convert FDR raw data into parameters expressed in engineering units'. However, an operator can only do that if the TC or STC holder has provided the corresponding information to the operator.

The quality of recording of cockpit voice recorders

Safety investigation authorities found that some CVR system installations do not provide the quality expected for the cockpit area microphone (CAM) and other audio channels. The issues identified include:

a) poor quality of the recording on the CAM channel;

b) saturation of the recording on the CAM channel by very low frequency vibrations;

c) excessive electrical background noise on a channel;

d) signals from the channels of flight crew members cancelling each other out;

e) clipping of the signals on the channels of flight crew members when coming from the oxygen mask microphones;

f) superimposition of microphone signals by radio reception signals;

g) inversion of the sign of the signal coming from the CAM channel, resulting in significant attenuation; and

h) incorrect allocation of the recording capacity to a channel.

These issues seem to be recurrent because of the lack of a framework for demonstrating the audio quality of a CVR system installation. Indeed, many factors potentially affecting the quality of the recorded audio cannot be addressed at the equipment level, such as the effects of components of the audio system (e.g. headsets), the air circulation in the vicinity of microphones (due to air conditioning systems), vibrations during the flight, electromagnetic interference, etc.

As a temporary measure, EASA initially reacted with the publication of Certification Memorandum CM-AS-001 'Quality of recording of cockpit voice recorders', issued in June 2012.

RMT.0586: Tyre pressure monitoring

Incorrect tyre pressure, and, in particular, the under-inflation of tyres, is a contributing factor to tyre- and wheel-failure-related accidents or incidents of large aeroplanes. These kinds of occurrences have continued to arise, despite the various actions taken by industry and regulators over the last 40 years. These actions include improvements in tyre maintenance practices, numerous communications on good practices for tyre pressure checks, and improvements in tyre and wheel robustness. Actions have also been taken to mitigate the severity of occurrences, i.e. the improvement of the protection of aeroplanes against the effects of tyre failures. However, the review of the reported occurrences indicates that a further reduction in the risk of a tyre failure is needed.

RMT.0673: Regular update of CS-25

CSs and AMC need to be updated regularly to ensure that they are fit for purpose, cost-effective, and can be implemented in practice.

Regular updates are issued when relevant data is available following an update of industry standards, feedback from certification activities, or minor issues raised by the stakeholders.

Go-around handling qualities and performance

a) CS 25.143(b)(2) – Sudden failure of the second critical engine

At Amendment 21 of CS-25, CS 25.143(b)(2) was amended with the addition of 'go-around' in the list of flight phases to be taken into account.

This amendment to CS 25.143(b)(2) was proposed in NPA 2017-06 as part of the actions aimed at reinforcing the demonstration of longitudinal controllability and authority at low speed in all

phases of flight, including go-around, having in mind that some aeroplanes are able to conduct a go-around with two failed engines, despite this not being required by CS-25.

The Flight Test Harmonisation Working Group (FTHWG) (established by the FAA Aviation Rulemaking Advisory Committee (ARAC)) in which EASA is represented, has been tasked to recommend appropriate revisions to the go-around all engine operative (AEO) and one engine inoperative (OEI) regulatory and advisory material (topic 18, 'Go-Around Handling Qualities & Performance' identified in the FTHWG work plan).

Discussions among the 'FTHWG topic 18' members revealed that the change to CS 25.143(b)(2) could create an unjustified burden on applicants and EASA for the demonstration of compliance, without any demonstrated significant safety benefit, given the low probability of and exposure time to a dual engine failure. Furthermore, if an applicant decides to include the operational capability and the related operational procedures for such go-arounds with two failed engines, it must anyway demonstrate the handling qualities and AFM procedures in accordance with the other CS-25 specifications.

b) AMC 25.101(g) – Go-around with OEI

AMC 25.101(g) does not provide sufficient guidance with respect to unacceptable go-around flight profiles. This has been addressed through the FTHWG recommendations under topic 18, and a recommendation to amend AMC 25.101(g) has been made.

c) AMC 25.143(b)(4) – Go-around manoeuvres

Chapter 2.1 of AMC 25.143(b)(4) states that 'the risk of a somatogravic illusion is high when encountering single or combined high values of pitch attitude (nose-up), pitch rate and longitudinal acceleration, associated with a loss of outside visual references'. Discussions within the FTHWG under topic 18 concluded that longitudinal acceleration effects might be the main contributor to the vertigo effect experienced by flight crews during high thrust/weight ratio go-arounds. This is not clearly reflected in the statement mentioned above.

Also, the FTHWG recommended other clarifications in AMC 25.143(b)(4).

d) AMC 25.119 – Landing Climb: All-engines-operating

AMC 25.119 does not take into account aeroplanes equipped with a Reduced Go-Around (RGA) thrust or power.

Minimum control speeds

EASA AMC 25.149 does not provide expanded definitions or test technique guidance for the determination of the VMCL or VMCL-2, as are provided in FAA Advisory Circular (AC) 25-7D. Only VMCL(1out) and VMCL-2(2 out) are addressed in AMC 25.149(f) and AMC 25.149(g) respectively.

Fuel tank and system lightning protection

On 20 September 2018, the FAA published a final rule amending Part 25 and entitled 'Transport Airplane Fuel Tank and System Lightning Protection'. The final rule [Docket No. FAA-2014-1027; Amendment No. 25-146], which amends paragraphs §25.954, §25.981, and Appendix H to Part 25, became effective on 19 November 2018.

The FAA also published:

— Advisory Circular (AC) 25.981-1D 'Fuel Tank Ignition Source Prevention Guidelines', dated 24 September 2018;

— Advisory Circular (AC)25.954-1 'Transport Airplane Fuel System Lightning Protection', dated 24 September 2018; and

— Advisory Circular (AC) 20-53C 'Protection of Aircraft Fuel Systems Against Vapor Ignition Caused by Lightning', dated 24 September 2018.

Cabin safety

Emergency demonstration

EASA CS-25 Appendix J on emergency demonstration does not provide a value regarding the exterior ambient light to be used.

References to FAA AC 25-17A

Several AMCs in Book 2 of CS-25 refer to FAA Advisory Circular (AC) 25-17A. This AC was revised with Change 1 dated 24/5/2016.

References to FAA AC 25-562-1B and AC 20-146

AMC 25.562 on Emergency landing dynamic conditions refers to FAA Advisory Circulars AC 25.562-1B and AC 20-146. These ACs have been respectively revised to AC 25.562-1B Change 1 and AC 20-146A.

Floor surfaces – standards for friction measurement

The AMC to CS 25.793 and CS 25.810(c) currently refer to FAA AC 25-17A, which itself refers to two MIL standards for friction measurement. However, other standards exist that are acceptable to EASA.

Emergency exit arrangement – naïve subject testing for the opening of passenger-operated exits

The current AMC 25.809 does not address the testing of emergency exits to be operated by passengers.

Emergency egress assisting means and escape routes – deployment and inflation tests

AMC 25.810 refers to FAA AC 25-17A. However, this AC does not provide guidance on the minimum number of assisting means (slide) deployment and inflation tests to be conducted on the aeroplane.

Life-preserver stowage provisions

CS 25.1411(f) requires that a life preserver must be within easy reach of each seated occupant. There is no AMC providing support for the demonstration of compliance.

Emergency egress assisting means installed in non-pressurised compartments

Emergency egress assisting means that are installed in non-pressurised compartments are exposed to extremely cold conditions during flight. The exposure to very low temperatures typically has two effects on the assisting means: it reduces the energy available in the

pressurised cylinders used for the inflation systems of escape slides, and more energy is required to inflate the escape slide because the inflatable material is stiffer. The combination of these two effects affects the performance of the assisting means, and this has to be taken into account when designing these systems. This topic is not specifically addressed in CS or AMC 25.810. Means of compliance have been provided for this topic on certification projects in certification review items (CRIs).

Emergency evacuation

AMC 25.810(c)(2) makes reference to FAA Advisory Circular (AC) 20-38A. However, this AC was cancelled on 16 October 2017.

Electronic AFM – computation of misleading primary information

In AMC 25.1581, Appendix 1 on 'Computerised Aeroplane Flight Manual', paragraph 6.a dealing with software integrity, the following statement is provided:

'The computation of hazardously misleading primary information such as take-off speeds, landing approach speeds, engine thrust or power, engine limit data or other related aeroplane performance data, should be improbable (as defined in CS 25.1309).'

However:

— The term 'improbable' is not defined in AMC 25.1309; this term dates back to JAA Advisory Material Joint (AMJ) 25.1309.

— Using the term 'improbable' may lead some industry stakeholders to directly make the assumption that the severity of this failure condition is consistent with a major failure condition at the aeroplane level, although a normal safety analysis could consider a more severe effect at the aeroplane level.

On-board weight and balance systems

CS-25 does not provide a reference to an acceptable standard which may be used for the design and certification of an on-board weight and balance system.

Air conditioning system

During the consultation of NPA 2018-05 (Regular update of CS-25 - 2018), comment 20 from the SNPL FRANCE ALPA technical committee highlighted the potential benefit of clarifying how applicants should implement the following point of the amended AMC 25.831(a) related to operating with the air conditioning system 'off':

'There should be a means to annunciate to the flight crew that the air conditioning system is selected to 'off'.'

In CRD 2018-05, EASA responded that a proposal would be made in the next NPA 'Regular update of CS-25'.

Flight guidance system

At CS-25 Amendment 4 (effective 27 December 2007), CS 25.1329 was broadly amended, and the following requirement was created as subparagraph (l):

'The autopilot must not create an unsafe condition when the flight crew applies an override force to the flight controls.'

AMC N°1 to CS 25.1329, Chapter 8.4.1 'Autopilot', provides the following:

'1) The autopilot should disengage when the flight crew applies a significant override force to the controls. The applicant should interpret 'significant' as meaning a force that is consistent with an intention to overpower the autopilot by either or both pilots. The autopilot should not disengage for minor applications of force to the controls (e.g., a pilot gently bumping the control column while entering or exiting a pilot seat during cruise).

(…)

2) If the autopilot is not designed to disengage in response to any override force, then the response shall be shown to be safe (CS 25.1329(l)). Under normal conditions, a significant transient should not result from manual autopilot disengagement after the flight crew has applied an override force to the controls (CS 25.1239(d)).

NOTE: The term 'override force' is intended to describe a pilot action that is intended to prevent, oppose or alter an operation being conducted by a flight guidance function, without first disengaging that function. One possible reason for this action could be an avoidance manoeuvre (such as responding to an ACAS/TCAS Resolution Advisory) that requires immediate action by the flight crew and would typically involve a rapid and forceful input from the flight crew.

Sustained application of an override force should not result in a hazardous condition. Mitigation may be accomplished through provision of an appropriate alert and flight crew procedure.

These provisions are harmonised with the equivalent FAA regulatory provisions.

A serious incident occurred on 15 December 2014 in the vicinity of Sumburgh Airport, Shetland (UK), and involved a Saab 2000, registration G-LGNO.

The aeroplane was inbound to land on Runway 27 at Sumburgh when the pilots discontinued the approach because of bad weather to the west of the airport. As the aeroplane established a southerly heading, it was struck by lightning. When the commander made nose-up pitch inputs, the aeroplane did not respond as he expected. After reaching 4 000 ft AMSL, the aeroplane pitched to a minimum of 19° nose down and exceeded the applicable maximum operating speed (VMO) by 80 kts, with a peak descent rate of 9 500 ft/min. The aeroplane started to climb after reaching a minimum height of 1 100 ft above sea level.

Recorded data showed that the autopilot had remained engaged, contrary to the pilots' understanding, and the pilots' nose-up pitch inputs were countered by the autopilot pitch trim function, which made a nose-down pitch trim input in order to regain the selected altitude.

The investigation conducted by Air Accidents Investigation Branch (AAIB) UK concluded as follows:

'(…)the alerting system on the Saab 2000 proved ineffective in this incident. Aural and visual alerting systems are less effective in situations when a flight crew is under stress, and if the flight crew is overriding the autopilot there is a high probability that they are doing so because of an unusual and possibly stressful situation. It is questionable whether any alerting system in this incident could have raised sufficient awareness among the flight crew to cause them to disengage the autopilot manually. It would be safer if the AC and AMC did not permit mitigation via an alerting system, and instead

required the autopilot to disengage following a force override. Most new airliner designs appear to be following this route.'

The following safety recommendation was issued to EASA (and the same one to the FAA):

UNKG-2016-054: 'It is recommended that the European Aviation Safety Agency amend the Acceptable Means of Compliance for Certification Specification 25.1329 to ensure that requirement 25.1329(l) can only be met if the autopilot automatically disengages when the flight crew applies a significant override force to the flight controls and the auto-trim system does not oppose the flight crew's inputs.'

Primary flight displays during unusual attitude and declutter modes

The investigation of the accident to Bombardier CL-600-2B19, registration SE-DUX, in Sweden, on 8 January 2016, found that the erroneous attitude indication on primary flight display (PFD) 1 was caused by a malfunction of inertial reference unit (IRU) 1. The pitch and roll comparator indications of the PFDs were removed when the attitude indicators displayed unusual attitudes (due to the PFD declutter function in an unusual attitude).

The following safety recommendation was addressed to EASA:

SR SWED-2016-005: 'EASA is recommended to ensure that the design criteria of PFD units are improved in such a way that pertinent cautions are not removed during unusual attitude or declutter modes. (RL 2016:11 R3)'.

Lightning protection and electrical bonding and protection against static electricity

The references to industry standards used in AMC 25.581 (Lightning protection) and AMC 25.899 (Electrical Bonding and Protection Against Static Electricity) are not to the latest revisions and, therefore, need to be amended. EASA has provided recurrent means of compliance in CRIs to allow applicants to use more recent revisions of these standards.

Furthermore, some acceptable industry standards are missing from these AMCs. Such standards have been provided to applicants in a generic interpretative material Certification Review Item (CRI) entitled 'Lightning protection direct effects'.

Operation without normal electrical power

EASA currently uses a generic means of compliance CRI that complements the content of AMC 25.1351(d). Such a generic CRI causes an administrative burden to the applicants and EASA.

Editorial corrections

In CS 25.807, the units of length and roundings are not consistent throughout the paragraph.

2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of Regulation (EU) 2018/1139. This Decision will contribute to the achievement of the overall objectives by addressing the issues outlined in Section 2.1.

The specific objectives of this Decision are provided below.

RMT.0249: Installation and maintenance of recorders – certification aspects

The specific objective is to improve the availability and quality of the data recorded by flight recorders in order to better support the safety investigation authorities in the investigation of accidents and incidents. This includes, in particular, the objectives to:

a) provide certification specifications and acceptable means of compliance to support compliance with the operational rules requiring the recording of data link communications;

c) improve the serviceability of flight recorders; and

d) improve the audio quality of CVR recordings.

RMT.0586: Tyre pressure monitoring

The specific objective is to decrease the risk of hazardous or catastrophic tyre failures of large aeroplanes that are caused by inadequate tyre inflation pressures. This is to be achieved through improvements that will ensure that tyre inflation pressures remain within the safe levels defined by the aeroplane manufacturer.

RMT.0673: Regular update of CS-25

The specific objective is to amend CS-25 based on the selection of non-complex, non-controversial, and mature subjects, with the ultimate goal being to increase safety.

Editorial corrections

Amend CS 25.807 to harmonise the units of length and roundings.

2.3. How we want to achieve it — overview of the amendments

RMT.0249: Installation and maintenance of recorders – certification aspects

Data link recording

New certification specifications and acceptable means of compliance are introduced for recorders performing the data link recording function: CS and AMC 25.1460.

The serviceability of flight recorders

Introduce into AMC 25.1457, AMC 25.1459, and AMC 25.1460 new sections explaining the expectations in terms of the instructions for continued airworthiness (ICA) provided by applicants.

The quality of recording of cockpit voice recorders

Introduce into AMC 25.1457 a new section explaining how applicants are expected to perform evaluations of CVR recordings.

CS 25.1457 is also amended to allow the use of more than four channels.

RMT.0586: Tyre pressure monitoring

CS 25.733 is amended to require applicants to provide a means to minimise the risk that a tyre is below its minimum serviceable inflation pressure during operation. A new AMC 25.733(f) is created to indicate how compliance can be shown; the AMC allows flexibility, as the applicant may choose to provide a task in the instructions for continued airworthiness (ICA) that requires operators to perform

tyre inflation pressure checks at a suitable time interval, and/or install a system that monitors the tyre inflation pressures.

RMT.0673: Regular update of CS-25

Go-around handling qualities and performance

a) CS 25.143(b)(2) – Sudden failure of the second critical engine

Remove 'go-around' from CS 25.143(b)(2).

b) AMC 25.101(g) – Go-around with OEI

AMC 25.101(g) is amended as recommended by the FTHWG to provide guidance with respect to the demonstration of go-around flight profiles.

c) AMC 25.143(b)(4) – Go-around manoeuvres

The AMC is amended to clarify the fact that longitudinal acceleration effects might be the main contributors to the vertigo effect experienced by flight crews during high thrust/weight ratio go-arounds. Other improvements are made as recommended by the FTHWG.

d) AMC 25.119 – Landing Climb: All-engines-operating

The AMC is amended to address the case of aeroplanes equipped with a Reduced Go-Around (RGA) thrust or power function.

Minimum control speeds

AMC 25.149(f) and (g) are amended in harmonisation with the corresponding section of FAA AC 25-7D.

Fuel tank and system lightning protection

CS 25.954, CS 25.981, AMC 25.954, AMC 25.981 are amended in harmonisation with the corresponding FAA regulations and Advisory Circulars.

Cabin safety topics

Emergency demonstration

CS-25 Appendix J, paragraph (a) is amended to harmonise with the corresponding FAA Part 25 Appendix J paragraph (a).

References to FAA AC 25-17A

References to FAA Advisory Circular (AC) 25-17A are replaced by references to AC 25-17A Change 1, dated 24.5.2016, which is the current version of the AC.

References to FAA AC 25-562-1B and AC 20-146

References to AC 25.562-1B and to AC 20-146 are replaced by references to AC 25.562-1B Change 1 and AC 20-146A respectively.

Floor surfaces – standards for friction measurement

The AMC to CS 25.793 and CS 25.810(c) are amended to introduce a list of standards for friction measurement accepted by EASA.

Emergency exit arrangement – naïve subject testing for the opening of passenger-operated exits

The AMC to 25.809(c) and (e) are created to address naïve subject testing for the opening of passenger-operated exits, reflecting the current and past practice for certification of this type of exit.

Emergency egress assisting means and escape routes – deployment and inflation tests

AMC 25.810(a)(1)(v) is created to indicate that at least one test should be conducted on the aeroplane (compatibility test), thereby reflecting what has been performed during EASA certification projects.

Life-preserver stowage provisions

AMC 25.1411(f) is created to introduce the retrievability testing procedure included in ETSO-C127b (aircraft seating systems) for all life vest container installations. New life vest retrieval standards were introduced into this ETSO, taking into account the lessons learned from the accident to Airbus A320 registration N106US, on 15 January 2009, on the Hudson River (USA).

Emergency assisting means installed in non-pressurised compartments

AMC 25.810 is amended to ensure that applicants take into account the effect of in-flight very low temperature conditions affecting the performance of emergency assisting means installed in non-pressurised compartments. The content of the previously issued CRI (MoC) has been taken into account.

Emergency evacuation

The reference to FAA Advisory Circular (AC) 20-38A is deleted in AMC 25.810(c)(2).

Electronic AFM – computation of misleading primary information

AMC 25.1581, Appendix 1, paragraph 6.a is amended to reflect the need to assess the potential safety effect at the aeroplane level, and use this assessment as a basis when determining the AFM software architecture and level of integrity.

On-board weight and balance systems

EUROCAE published document ED-263 'Minimum Operational Performance Standard for Onboard Weight and Balance Systems' dated June 2019.

ED-263 may be used by applicants and EASA to support the design and certification of on-board weight and balance systems (OBWBS) on CS-25 large aeroplanes. The standard addresses Class II OBWBS, i.e. advisory systems which are used by the flight crew for comparison with the gross weight and centre of gravity information provided to them by ground operations services (e.g. load sheets).

AMC 25-1 is created to refer to this standard and offer the possibility to applicants to use it.

Air conditioning system

AMC 25.831(a) is amended to clarify that an indication of the status of the system is not sufficient, but that an alert should be triggered after the end of the allowed limited time period if the air conditioning system is still in the 'off' position.

Flight guidance system

AMC N°1 to CS 25.1329 is amended in order to:

— Address a safety recommendation regarding the automatic trim response during a pilot override. Although it is not accepted that compliance with CS 25.1329(l) can only be shown if the autopilot automatically disengages, a clarification is provided with regard to potential hazards for systems without automatic disengagement: the automatic trim should not oppose the flight crew's commands in any manner that would result in unacceptable aeroplane motion, and mitigation may be accomplished through the provision of an appropriate alert and flight crew procedure, and

— Bring clarification regarding the autopilot disengagement aural alert: it should sound for at least a single cycle even when the autopilot is disengaged by a pilot.

Primary flight displays during unusual attitude and declutter modes

AMC 25-11 is amended to clarify that some alerts should remain visible when the primary flight displays declutter. Guidance is provided to indicate that any fault that can contribute to, or cause, misleading presentations of primary flight information, should have its failure message, flag, or comparative monitoring alert, remain on the main primary flight display during declutter modes, as long as the associated indication is maintained on the primary flight display).

Lightning protection and electrical bonding and protection against static electricity

AMC 25.581 and AMC 25.899 are amended in order to refer to the current revisions of the mentioned industry standards, and to add other industry standards that are accepted by EASA.

Operation without normal electrical power

The content of the generic means of compliance CRI is introduced into AMC 25.1353(d).

Editorial corrections

CS 25.807 is amended to harmonise the units of length (in cm, except large distances in m) and the roundings.

2.4. What are the stakeholders' views

RMT.0249: Installation and maintenance of recorders – certification aspects

Overall, the proposal was welcomed by the majority of the commentators who made various proposals that allowed improvement of the CS-25 text.

However, some industry representatives raised concerns that some tasks mentioned in the propose AMC sections dealing with flight recorder ICAs may increase maintenance costs for some operators. The wording used by EASA in these sections was also sometimes considered too prescriptive. One aeroplane manufacturer suggested relying on the MSG-3 methodology (used to develop Maintenance Review Board reports), or equivalent, to identify the required maintenance tasks for failures or faults that are not apparent to the flight crew (e.g. with flight deck indications).

EASA reminds readers that the objective is to support operators by giving them adequate means to comply with the already existing ICAO Annex 6 standards and the EU Air Operations rules. EASA also

reminds readers that the MSG-3 is not able to identify some required recorder maintenance tasks because of the criteria used in the method (safety effect assessment).

Taking into account these concerns, the ICA section of the AMCs has been revised to ensure that it does not prescribe maintenance tasks. It now recommends that ICAs should address the failures that may affect the correct functioning of the flight recorder system or the quality of the recording; examples of failures are also provided.

For further information, please refer to CRD 2019-12, which provides responses to the individual comments.

RMT.0586: Tyre pressure monitoring

Overall, the proposal was welcomed by a majority of the commentators who made various proposals that allowed improvement of the CS-25 text.

Nevertheless, some commentators suggested relying on the MRB process to solve the presented issue. EASA wishes to remind readers that the MRB process is an optional process, and that some large aeroplanes have been certified without using this process. Furthermore, EASA cannot impose measures on tyre pressure related tasks if the other MRB members do not agree. EASA is also aware that recent MRBs of non-European aeroplane types decided on tyre pressure check intervals which are beyond what EASA considers to be reasonably safe. Therefore, EASA does not wish to rely on the MRB process to solve this issue.

Several comments also highlighted that the proposed new CS 25.733(f) was too prescriptive and that it should allow more flexibility to applicants regarding possible means to reach the intended objective, i.e. minimise the risk of operating an aeroplane with inadequate tyre inflation pressures. EASA has amended the proposal to meet these expectations: the objective is provided in CS 25.733(f), while AMC 25.733(f) provides options that can be used to show compliance.

Some commentators asked EASA to also accept ground tyre pressure indication systems, together with operational procedures, as potential means to meet the objective, as this was not offered in the proposed CS 25.733(f). Such systems are now mentioned in the options provided by AMC 25.733(f).

Other commentators requested EASA to accept integrated aircraft health management concepts in which an aircraft health monitoring system would send an alert to a ground station requiring an action by maintenance personnel. EASA considers that it would be premature to introduce such systems into the AMC, as the concept is still under development. Industry may nevertheless propose to certify such systems when they are considered mature enough.

Finally, some commentators explained that the daily check provided in the AMC may create concerns for operators that do not operate daily (for example, for business aeroplane operations). EASA reminds readers that the AMC provides the possibility to substantiate a different interval. Meanwhile, the recommended pressure check interval should only be established in order to ensure the airworthy condition of the tyre. Whether an aeroplane flies regularly or not is an operational factor. If the aeroplane does not fly regularly, the operator must decide between either servicing the tyres regularly (to ensure that the pressure remains above the minimum serviceable pressure), or taking appropriate actions to return the tyres to an airworthy condition after the pressure levels have dropped below the minimum serviceable pressure.

For further information, please refer to CRD 2020-05, which provides responses to the individual comments.

RMT.0673: Regular update of CS-25

Overall, the proposal was welcomed by a majority of the commentators who made various proposals that allowed improvement of the CS-25 text. Nevertheless, some industry stakeholders (mainly some aeroplane manufacturers) made some proposals that would disharmonise CS-25 with the equivalent FAA documents. EASA chose to maintain as much harmonisation as possible with the FAA rules and ACs.

For further information, please refer to CRD 2020-01, which provides responses to the individual comments.

2.5. What are the benefits and drawbacks

RMT.0249: Installation and maintenance of recorders – certification aspects

Data link recording

The new CS and AMC 25.1460 will bring an economic benefit to both applicants and EASA, as it will ease the certification process. A more robust set of specifications also brings benefits to accident and incident investigations, thus improving safety.

The serviceability of flight recorders

The amendments of the various AMCs, corresponding to the specifications for recorder installations, will create safety and economic benefits over the current situation, in which some accident investigations are hindered.

The quality of recording of cockpit voice recorders

The amendment of AMC 25.1457 will create safety and economic benefits over the current situation. It will, overall, ensure that the audio quality of a CVR is thoroughly investigated and reported before it is certified. This will bring benefits to operators, aircraft accident investigation bodies, EASA, and design organisations.

RMT.0586: Tyre pressure monitoring

The amendments will ensure that tyre inflation pressures are checked at an appropriate time interval, thereby minimising the risk of operating with an unsafe tyre inflation pressure. This will improve safety (by reducing the number of tyre failures) without any significant economic impact, and with no environmental or social impact. The new CS-25 provisions are objective oriented, flexible and do not mandate design changes.

RMT.0673: Regular update of CS-25

The amendments reflect the state of the art of large aeroplane certification and improve the harmonisation of CS-25 with the FAA regulations. Overall, this will provide a moderate safety benefit, will have no social or environmental impacts, and will provide some economic benefits by streamlining the certification process.

3. How do we monitor and evaluate the rules

RMT.0249: Installation and maintenance of recorders – certification aspects

The monitoring by EASA of the effects created by this amendment of CS-25 will consist of:

a) experience gathered by EASA from future CS-25 type certification projects in the field of flight recorder installations, and

b) in the long term, the trend of the issues encountered with flight recorders during investigations of accidents and incidents, as well as other feedback from operators and oversight authorities.

Item a) depends on the applications received after this amendment of CS-25. A review could not be performed earlier than 5 years after the date of applicability of the CS-25 amendment, and it would require the availability of experience from several certification projects for each type of aircraft.

Item b) would be available once the new type designs have entered into service and experienced sufficient flight time, which would require several years (at least 5 years to obtain statistically relevant information).

RMT.0586: Tyre pressure monitoring

The monitoring by EASA of the effects created by this amendment of CS-25 will consist of:

a) experience gathered by EASA from future CS-25 type certification projects regarding the means used by applicants to comply with the new specification to minimise the risk of inadequate tyre inflation pressures;

b) the trend in the number of tyre pressure monitoring systems, or other types of alerting systems, being installed; and

c) in the long term, the trend in the number of accidents and incidents associated with tyre failures, in particular when such failures are caused by the inadequate inflation of tyres.

Item a) depends on the applications received by EASA after the amendment of CS-25. A review may be made at the earliest five years after the amendment of CS-25.

Item b) depends on the decisions made by large aeroplane manufacturers and operators, as the installation of these systems is not mandated. A review may be made at the earliest five years after the amendment of CS-25.

Item c) would be available once the new type designs have entered into service and experienced sufficient flight time, which would require several years (at least 5 years to obtain statistically relevant information).

Items b) and c) also depend on the entry into force of an equivalent new Part-26 rule (mandating a means to minimise the risk of inadequate tyre inflation pressures for already certified large aeroplanes) proposed by EASA to the European Commission, if it is adopted.

RMT.0673: Regular update of CS-25

The changes made shall be assessed by EASA via the experience gathered from CS-25 certification projects after this amendment, via the monitoring ensured in the frame of the usual continuing airworthiness process followed by EASA and type certificate holders, and also through the

investigations of occurrences and safety recommendations from designated safety investigation authorities.

4. References

4.1. Affected decisions

— Decision No. 2003/2/RM of the Executive Director of the Agency of 17 October 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for large aeroplanes (« CS-25 »)

4.2. Other reference documents

— ICAO Annex 6, Part I (Eleventh Edition, July 2018 – incorporating Amendments 1 to 43), Appendix 8, Section 1 (General requirements) and Section 7 (Inspections of flight recorder systems)

— ICAO Annex 6, Part III (Ninth Edition, July 2018 – incorporating Amendments 1 to 22), Appendix 4, Section 1 (General requirements) and Section 6 (Inspections of flight recorder systems)

— EUROCAE Document ED-93 (dated November 1998), 'Minimum aviation system performance specification for CNS/ATM message recording systems'

— EUROCAE Document ED-112A (dated September 2013), 'Minimum operational specification for crash protected airborne recorder systems'

— European Technical Standard order ETSO-C62e ('Aircraft Tyres'), dated 5 July 2012

— EASA Safety Information Bulletin (SIB) No 2013-10 issued on 10 July 2013 ('Properly Inflated Aircraft Tyres')

— SAE Aerospace Recommended Practice (ARP) 6152 'Aircraft Tires Service Overload Capability' issued on 1 January 2013, reaffirmed on 2 September 2018

— SAE Aerospace Recommended Practice (ARP) 5265 'Minimum Operational and Maintenance Responsibilities for Aircraft Tire Usage' first issued in 1990, revision B reaffirmed on 17 October 2019

— SAE Aerospace Information Report (AIR) 5699, issued November 2007, reaffirmed on 25 October 2013 ('A Guide for the Damaging Effects of Tire and Wheel Failures')

— FAA Safety Alerts for Operators (SAFO) 09012 issued on 12 June 2009 ('Dangers of Improperly Inflated Tires') and SAFO 11001 issued on 6 January 2011 ('The Importance of Properly Inflated Aircraft Tires')

— Aviation Rulemaking Advisory Committee-Transport Airplane Performance and Handling Characteristics-Continuing a Task. Notice of phase 2 task assignment for the Aviation Rulemaking Advisory Committee (ARAC). Federal Register Volume 79, Number 70 (Friday 11 April 2014)

— FAA final rule [Docket No. FAA-2014-1027; Amendment No. 25-146], 'Transport Airplane Fuel Tank and System Lightning Protection', Federal Register / Vol. 83, No. 183 / Thursday 20 September 2018

— FAA Advisory Circulars (AC):

— AC 25.981-1D 'Fuel Tank Ignition Source Prevention Guidelines' dated 24 September 2018, and

— AC 25.954-1 'Transport Airplane Fuel System Lightning Protection' dated 24 September 2018.

5. Related documents

— CRD 2019-12 ‘Installation and maintenance of recorders – certification aspects’

— CRD 2020-05 ‘Tyre pressure monitoring’

— CRD 2020-01 ‘Regular update of CS-25’