



## TERMS OF REFERENCE

<b>Task Nr:</b>	25.070
<b>Issue:</b>	2
<b>Date:</b>	19 October 2010
<b>Regulatory reference:</b>	Basic Regulation (EC) 216/2008 <sup>1</sup> , Regulation (EC) 1702/2003 <sup>2</sup> , CS-25 <sup>3</sup>
<b>Reference documents:</b>	Pre-RIA 25.070 dated 06 March 2009

### 1. Subject:

Incorporation of generic SC and AMC CRIs in CS-25

### 2. Problem/Statement of issue and justification; reason for regulatory evolution (regulatory tasks):

During project certification, the Agency uses CRIs (Certification Review Items)<sup>4</sup> to introduce new requirements called "Special Conditions" (SC), and/or guidance material, means of compliance (associated to the SC or to existing Certification Specifications requirements).

In the Annex "Part-21" of Regulation (EC) 1702/2003, paragraph 21A.16B contains a definition of "Special Conditions":

*"The Agency shall prescribe special detailed technical specifications, named special conditions, for a product, if the related airworthiness code does not contain adequate or appropriate safety standards for the product, because:*

- 1. The product has novel or unusual design features relative to the design practices on which the applicable airworthiness code is based; or*
- 2. The intended use of the product is unconventional; or*
- 3. Experience from other similar products in service or products having similar design features has shown that unsafe conditions may develop."*

Some of the existing SC issued by the Agency have a "generic" characteristic, i.e. they

<sup>1</sup> Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.03.2008, p. 1). Regulation as last amended by Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009 (OJ L 309, 24.11.2009, p. 51).

<sup>2</sup> Regulation (EC) 1702/2003 of 24 September 2003 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production (OJ L 243, 27/09/2003, p. 6). Regulation as last amended by Regulation (EC) No 1194/2009 of 30 November 2009 (OJ L 321, 8.12.2009, p. 5).

<sup>3</sup> Decision No. 2003/02/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»). Decision as last amended by Decision No. 2010/005/R of the Executive Director of the Agency of 5 August 2010 («CS-25 Amendment 9»).

<sup>4</sup> Refer to "Type Certification Procedure" document (ref. C.P008-02), available on EASA website.

are applicable to all products, or all products incorporating a certain technology, or all aircraft performing certain specific operations. Some of these SC have been used for many years on several certification projects.

Under paragraph 21A.16A Airworthiness Codes, there is an obligation on the Agency as follows:

*"The Agency shall issue in accordance with Article 14 of the Basic Regulation airworthiness codes as standard means to show compliance of products, parts and appliances with the essential requirements of Annex I to the Basic Regulation. Such codes shall be sufficiently detailed and specific to indicate to applicants the conditions under which certificates will be issued."*

Article 14, now Article 19 of the Basic Regulation EC 216/2008, is more specific in that Certification Specifications (CS), Acceptable Means of Compliance (AMC) and Guidance Material (GM) *"shall reflect the state of the art and the best practices in the field concerned and be updated taking into account worldwide aircraft experience in service, and scientific and technical progress"*.

Retaining generic SC and/or guidance material, means of compliance in Certification Review Items (CRI) is therefore not in compliance with the Basic Regulation and does not facilitate transparent and open regulation.

The intent of this task is therefore to incorporate existing generic CRI in CS-25 in order to reflect the objectives of the Basic Regulation.

### 3. Objective:

To upgrade CS-25 by introducing generic CRI containing Special Conditions and/or guidance material, means of compliance.

### 4. Specific tasks and interface issues (Deliverables):

- 1) Review the existing CRI and select the items which are mature and generic (i.e. applicable to all aeroplanes, or aeroplanes incorporating a certain technology, or for certain specific operations). This first step has already been initiated and the list of selected items is attached below.
- 2) For each selected item, the existing material will be used to propose a text which will be integrated in Book 1 and/or Book 2 of CS-25.

### 5. Working Methods (in addition to the applicable Agency procedures):

Agency

### 6. Time scale, milestones:

NPA publication: 2010/Q4

CS-25 Decision: 2012/Q1

### Issue 2:

- Some of the selected CRI items are removed ("Primary In-flight Ice Detection Systems", "Falling and blowing snow", "Freezing fog"), since they will be covered by the rulemaking task 25.058 "Large Aeroplane Certification Specifications in Supercooled Large Drop, Mixed phase, and Ice Crystal Icing Conditions". The reason for this change is that task 25.058 will impact the rule or guidance material/means of compliance addressed by these items, thus it is preferred to deal with them in the same task.
- "Fireproofness of engine cowlings": the description is revised to correct a mistake (the JAA proposed NPA was not published).

**Annex to ToR 25.070: List of selected items**

Title	Domain	Description
Protection of aircraft systems and networks from internal and external unauthorised access threats	Avionics	<p>CS-25 and current system safety assessment policies and techniques do not adequately address potential network vulnerabilities which could be caused by unauthorised access of aircraft data busses, networks and servers, either internal or external to the aircraft which utilise sophisticated networking principles. Recently, Special Conditions (SC) have been proposed to ensure that safety of flight is not compromised by these kinds of threats.</p> <p>It is thus proposed to include these requirements and associated AMC into CS-25.</p>
Lithium – Ion battery installation	Electrical systems	<p>The Lithium-Ion (Li-Ion) battery failure and operational characteristics, and maintenance requirements differ significantly from the ones of Nickel Cadmium (Ni-Cd) and lead acid rechargeable batteries, which are currently approved for installation on Large Aeroplanes.</p> <p>The use of Li-Ion battery installations on Large Aeroplanes has prompted EASA to review the adequacy of the existing battery requirements with respect to that chemistry. As a result of this review, EASA has determined that the existing requirements do not adequately address several failure, operational, and maintenance characteristics of Li-Ion batteries that could affect safety and reliability of those battery installations. The main topics to be addressed are:</p> <ul style="list-style-type: none"> <li>- Overcharging;</li> <li>- Over-discharging;</li> <li>- Flammability of Cell components.</li> </ul>
Stalling speeds for structural design	Structure	<p>Harmonisation between JAA and FAA has already been achieved on this subject. The result is that for calculation of structural design speeds the stalling speeds should be taken to be the 1-g stalling speeds (and not <math>V_{s,min}</math>) in the appropriate flap configuration. This structural interpretation of stalling speed should be used in connection with the paragraphs CS 25.333 (b), CS 25.335, CS 25.335(c)(d)&amp;(e), CS 25.479(a), CS 25.481(a)(1) and CS 25.729(a)(1)(ii).</p>
Design manoeuvre requirements	Structure	<p>The existing design manoeuvre requirements of CS-25 mostly address aircraft with mechanical control systems. For aircraft with electronic flight control systems where the motion of the control surfaces does not bear a direct relationship to the motion of the cockpit control devices, these design manoeuvre requirements need to be redefined.</p> <p>It is proposed to amend CS 25.349 and CS 25.351 to address aircraft equipped with</p>

		electronic flight control systems, and to include in CS-25 Book 2 the associated Acceptable Means of Compliance (AMC).
Design dive speed	Structure	<p>For aircraft equipped with a high speed protection function, the presence of this function could influence the results of the traditional recovery manoeuvre which is used in CS 25.335(b)(1) to define a minimum speed increment between <math>V_C/M_C</math> and <math>V_D/M_D</math>. To ensure the intended speed margin, a new interpretation of the dive manoeuvre requirement is needed.</p> <p>Also, the load and flutter conditions to be considered when this function has failed or malfunctioned needs further clarification.</p> <p>It is proposed to amend CS 25.335(b)(1) to address aircraft equipped with a high speed protection function, and to include in CS-25 Book 2 the associated AMC.</p>
Side stick controls	Structure	<p>Limit pilot forces:</p> <p>CS 25.397(c), which defines limit pilot forces and torques, applies to conventional wheel or stick control and is therefore not adequate for aircraft equipped with a side stick instead of a conventional control stick.</p> <p>It is proposed to amend CS 25.397(c) to address aircraft equipped with a side stick.</p>
	Flight test/Flight controls	<p>Motion and effect of controls:</p> <p>Aircraft which are equipped with a side stick control system are not dealt with in CS-25.</p> <p>The involved paragraphs are: CS 25.143 and 777.</p>
Towbarless towing	Structure	<p>In contrast with more conventional ground handling operations with tow bars, where the loads acting on the nose landing gear are limited by tow bar shear pin provisions or similar features designed to shear at a pre-determined loading level, during towbarless towing operations the braking and acceleration loads of the towing vehicle are transmitted directly to the nose gear.</p> <p>This system of towing the aeroplane may introduce higher static and fatigue loads into the nose landing gear and its support structure as currently considered in CS 25.509 and CS 25.571.</p> <p>Also, the point of load application may be different between towbarless towing operations and operations with tow bars.</p> <p>Proposal: For towbarless towing operations, to include in CS-25 Book 2 the associated Acceptable Means of Compliance (AMC).</p>
	Hydromechanical and Flight Controls systems	<p>The existing paragraph CS 25.745 (d) is to preclude damage to the nose wheel steering when using a towing attachment on the nose landing gear. The use of towbarless towing vehicles do not anymore ensure that aeroplanes are designed such that any means to be used for</p>

		<p>ground manoeuvring should not have the capability to cause damage to the steering system. At the time JAA published INT/POL/25-13 dated 01 June 2001.</p> <p>It is proposed to amend CS 25.745 and to include in CS-25 Book 2 Acceptable Means of Compliance (AMC).</p>
Steep approach and landing	Flight test/ Structure	<p>Certification of aircraft for steep approach (4.5 degrees or more) is currently done through Special Conditions. It is thus necessary to set the safety standard for approach and landing at airfields where there is a final approach path above 4.5 degrees. Involved paragraph are CS 25.121(d) and 25.125.</p>
Class E Cargo compartments	Cabin safety	<p>Systems within the Class E cargo compartments shown to be essential must be adequately protected against fire. A "generic" SC coming from JAA INT/POL/25/15 exists.</p> <p>Special Condition to define the requirements to regulate the in-flight access to a Class E cargo compartment by supernumeraries.</p>
Cabin stretchers	Cabin safety	<p>It is proposed to define the applicable certification requirements for stretchers installed in a passenger compartment. A generic SC exists which exempts from dynamic crashworthiness requirements. In addition, mattresses to be tested to seat cushion flammability standards are provided in a generic interpretative material.</p>
Escape Slides Operation in Wind	Cabin safety	<p>There is a need to include the additional effect of engines at ground idle when substantiating the performance of escape slides in wind conditions (refer to CS 25.810). A generic CRI has been used in the past to require this.</p>
Control Surface Awareness Electronic/ Flight Control Systems	Hydromechanical and Flight Controls systems/Structure	<p>An ARAC Working Group has worked on a new proposal for paragraphs CS 25.671 and CS 25.672 and associated advisory material. At that time, this proposal was considered not mature enough and only the part which clarifies the condition for the jamming configuration was introduced.</p> <p>It is proposed to include in CS-25 Book 2 the corresponding CS 25.671 associated Acceptable Means of Compliance (AMC).</p>
Oxygen outlets in the galley work areas	ECS & Ice Protection/Cabin Safety	<p>CS 25.1447(c)(3) specifies that there must be at least two outlets and units in all work areas that may be occupied by passengers or crew members during flight.</p> <p>It is proposed to define the commonly accepted interpretation of the rule, called the "five feet/five second" interpretation.</p>
Fireproofness of engine cowlings	Powerplant & Fuel system	<p>CS 25.1193(e) requires the firewall, including fire zone skins, be fireproof.</p> <p>Use of light alloys and/or composite materials in more recent aircraft was the reason for taking</p>

		<p>into account, with respect to fireproof characteristics, the effect of approach minimum speed ventilation due to external air flow on nacelle skin.</p> <p>Furthermore, with respect to openings in the nacelle skin, demonstration has to be done that either no flame can propagate through these openings, or there is no additional hazards to any other aircraft zone.</p> <p>This interpretation of CS 25.1193(e) has been commonly applied in several past certification exercises. A P-NPA 25E-266 was prepared by JAA to propose an ACJ 25.1193(e) (Acceptable Means of Compliance) based on this interpretation and it was harmonised with FAA by the Powerplant Harmonization Working Group (PPIHWG). However, the NPA was not published and the resulting material still has not been included in CS-25 nor FAR 25.</p> <p>It is proposed to use the material from NPA 25E-266 and incorporate it in CS-25 Book 2.</p>
Stalling and scheduled operating speeds	Flight test/Flight controls	<p>Aircraft that are equipped with a low speed protection system which prevents reaching the true stall, and that cannot be overridden by the pilot, are not fully dealt with in CS-25. The requirements of CS-25 are therefore to be adapted to consider this stall protection function.</p> <p>The involved paragraphs are: CS 25.103, 25.143 (h), 25.145, 25.201, 25.203, 25.207, 25.1323.</p>
Flight Envelope Protection	Flight test/Flight controls/Structure	<p>Fly-by-wire aircraft are capable of behaviour that a conventional mechanical system cannot achieve. CS-25 does not address this. This involves paragraph CS 25.143.</p> <p>A special condition also ensures a minimum load factor operational envelope.</p>
Derate/flex take-off	Flight test	<p>Currently CS-25 limits the amount of thrust reduction to 25% of the Maximum Take-Off thrust.</p> <p>This has been agreed as unnecessarily limiting and allowing a Reduced Take-Off Thrust below 75% of the MTO thrust is acceptable.</p> <p>Refer to CS 25.101, 25.149, 25.1521, 25.1581.</p>
Go-around performance	Flight test	<p>Current CS-25 Book 2 does not have compliance methods to ensure that any proposed go-around procedure remains safe.</p> <p>Involved paragraphs are CS 25.101(g), 25.101(h), 25.121(d).</p>