Proposed Special Condition on Electrical Wiring Interconnection System (EWIS)

Applicable to Large Aeroplane STC applicant

Introductory note:

The following Special Condition has been classified as an important Special Condition and as such shall be subject to public consultation, in accordance with EASA Management Board decision 02/04 dated 30 March 2004, Article 3 (2.) of 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."

Statement of Issue

Investigations of aeroplane accidents (including the midair explosion of a B747 and the crash of an MD 11) and later examinations of different aeroplanes types have identified safety concerns associated with aeroplane wiring systems that could potentially result in an unsafe condition.

To enhance the safety of large aeroplanes' wiring systems, EASA has developed in cooperation with FAA a regulatory package that includes new and revised certification and maintenance requirements to address the shortcoming of current wiring systems design, installation and maintenance practices. The new certification requirements are contained in CS-25 amendment 5 dated 5 September 2008.

By letter *"EASA D (2008) CEXP/PME/84328"* dated 31 October 2008, EASA has requested that applicant for an EASA STC to conduct Electrical Wiring Interconnection System (EWIS) analyses necessary and, when required, develop Instructions for Continued Airworthiness (ICA) on EWIS by 7th of June 2010 or the date of issuance of the certificate whichever occurs later.

Under PART 21A.103(a)(2)(iii), an applicant shall be entitled to have a major change to a type design approved by the Agency after the applicant has shown that no feature or characteristic makes it unsafe for the uses for which certification is requested.

This Special Condition is not needed in case CS-25 amendment 5 is the applicable requirement of the STC.

When CS-25 amendment 5 is not the applicable Certification Specification of the TBD product, in accordance with PART 21A.16B(a)(3), a Special Condition shall be raised if experience from other similar products in service or products having similar design features, has shown that unsafe conditions may develop. Consequently, for TBD company name certification, the Special Condition H-01 defined in appendix is proposed based on a specific provision of CS-25 amendment 5 Appendix H.

This Special Condition is based on the requirements listed in the above EASA letter:

Each applicant for a Type certificate of an aeroplane having

a- a maximum type-certificated passenger capacity of 30 or more ; or

b- a maximum payload capacity of 3402 kg (7500 pounds) or more

must develop and submit for approval by the Agency, Instructions for Continued Airworthiness (ICA) derived from the ENHANCED ZONAL ANALYSIS PROCEDURE (EZAP), for the representative aeroplane's Electronic Wiring Interconnection System (EWIS) as defined in CS 25.1701 in accordance with CS-25 Appendix H paragraph H25.5 and AMC appendix H25.5 paragraphs 1 and 6.

TC holder of the affected aeroplane type will have furnished the basic EWIS ICA at the latest by the 10th of December 2009.

The compliance plan for the STC must address whether the design change for which approval is sought does necessitate a revision of the EWIS ICA developed for that particular aeroplane model.

EASA AMC 20-21 (programme to enhance aeroplane EWIS maintenance) and FAA AC 25-27 (Development of transport category airplanes EWIS ICA using an EZAP) provide additional guidance on whether the design change necessitates a revision of the EWIS ICA.

CS-25 Special Condition H-01

Add to: **Appendix H Instructions for Continued Airworthiness**

H25.5 Electrical Wiring Interconnection Systems Instructions for Continued Airworthiness

I.
The applicant must conduct analyses if the STC requires a revision of the Instructions for Continued Airworthiness (ICA) applicable to Electrical Wiring Interconnection System (EWIS) as defined below that include the following:

Maintenance and inspection requirements for the EWIS developed with the use of an enhanced zonal analysis procedure (EZAP) that includes:

a. Identification of each zone of the aeroplane.

b. Identification of each zone that contains EWIS.

c. Identification of each zone containing EWIS that also contains combustible materials.

d. Identification of each zone in which EWIS is in close proximity to both primary and back-up hydraulic, mechanical, or electrical flight controls and lines.

e. Identification of :

- Tasks, and the intervals for performing those tasks, that will reduce the likelihood of ignition sources and accumulation of combustible material, and

- Procedures, and the intervals for performing those procedures, that will effectively clean the EWIS components of combustible material if there is not an effective task to reduce the likelihood of combustible material accumulation.

f. Instructions for protections and caution information that will minimize contamination and accidental damage to EWIS, as applicable, during the performance of maintenance, alteration, or repairs.

The ICA must be in the form of a document appropriate for the information to be provided, and they must be easily recognizable as EWIS ICA.

II.

For the purpose of this SC, the following EWIS definition applies:

(a) Electrical wiring interconnection system (EWIS) means any wire, wiring device, or combination of these, including termination devices, installed in any area of the aeroplane for the purpose of transmitting electrical energy, including data and signals between two or more intended termination points. Except as provided for in subparagraph (c) of this paragraph, this includes:

(1) Wires and cables.

(2) Bus bars.

(3) The termination point on electrical devices, including those on relays, interrupters, switches, contactors, terminal blocks, and circuit breakers and other circuit protection devices.

(4) Connectors, including feed-through connectors.

(5) Connector accessories.

(6) Electrical grounding and bonding devices and their associated connections.

(7) Electrical splices.

(8) Materials used to provide additional protection for wires, including wire insulation, wire sleeving, and conduits that have electrical termination for the purpose of bonding.

(9) Shields or braids.

(10) Clamps and other devices used to route and support the wire bundle.

(11) Cable tie devices.

(12) Labels or other means of identification.

(13) Pressure seals.

(b) The definition in subparagraph (a) of this paragraph covers EWIS components inside shelves, panels, racks, junction boxes, distribution panels, and back-planes of equipment racks, including, but not limited to, circuit board back-planes, wire integration units and external wiring of equipment.

(c) Except for the equipment indicated in subparagraph (b) of this paragraph, EWIS components inside the following equipment, and the external connectors that are part of that equipment, are excluded from the definition in subparagraph (a) of this paragraph:

(1) Electrical equipment or avionics that is qualified to environmental conditions and testing procedures when those conditions and procedures are :

(i) Appropriate for the intended function and operating environment, and

(ii) Acceptable to the Agency.

(2) Portable electrical devices that are not part of the type design of the aeroplane. This includes personal entertainment devices and laptop computers.

(3) Fibre optics.

III.

The following can be used as a guide to assess the impact of the STC on the EWIS ICA EZAP and re-application of EZAP to STC affected zone:

Step 1: Does the STC:
-Affect or modify wiring or its environment,
-Install or result in wiring being located within 5 cm (2 inches) of both primary and back-up hydraulic, mechanical, or electrical flight controls,
-Change the density of the zone or
-Change the potential effects of fire in the zone?

Step 2: If answer to step 1 is “NO”, no further action required

Step 3: If answer to step 1 is “YES”, perform EZAP analysis

Step 4: Determine if there is an existing (MRBR) EZAP task(s) that is applicable and effective

Step 5: If answer to step 4 is “YES”, no further action required because the existing EZAP derived maintenance task(s) are adequate

Step 6: If answer to step 4 is “NO”, develop appropriate task(s) and incorporate them into existing maintenance program

In case the initial assessment shows that no revision is necessary for the EWIS ICA, this shall be substantiated as part of the certification package for the approval of the STC.

In case the initial assessment shows that a revision to the EWIS ICA may be necessary, the applicant must perform an EZAP analysis and, if necessary, submit final EWIS ICA to the Agency by 7 June 2010 or the date of issuance of the certificate whichever occurs later.